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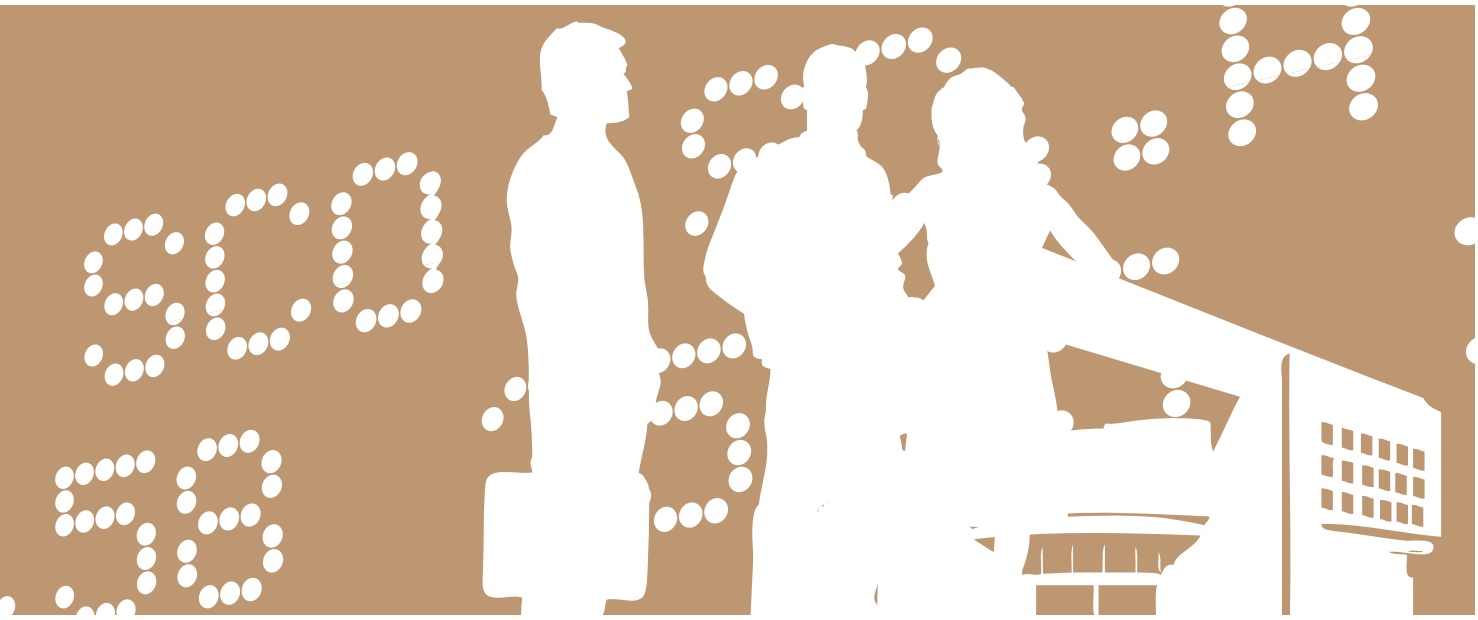

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Do Markets Erode Social Responsibility?

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Abstract

This paper studies the stability of socially responsible behavior in markets. We develop a laboratory product market in which low-cost production creates a negative externality for third parties, but where alternative production with higher costs entirely mitigates the externality. Our data reveal a robust and persistent preference for avoiding negative social impact in the market, reflected both in the composition of product types and in a price premium for socially responsible products. Socially responsible behavior in the market is generally robust to varying market characteristics, such as increased seller competition and limited consumer information. Fair behavior in the market is slightly lower than that measured in comparable individual decisions.

Keywords: Social responsibility, markets, externalities, competition, fairness
JEL classification: C92, D03, D62

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1. Introduction

Adam Smith's metaphor of the invisible hand illustrates the idea that decentralized interaction of independent actors, through market exchange, leads to an efficient allocation of societal resources. In fact, there exists widespread evidence that markets often fulfill this function. However, unregulated market exchange is also often blamed as a source of social ills. For example, citing accounts of environmental damage, animal cruelty, unsafe working conditions and persistent inequality, many scholars have raised the question of whether the inherent nature of market exchange has a perverting influence on people's motivations to exhibit concern for the social impact of their actions (Bowles, 1998; Sandel, 2012; Falk and Szech, 2013; Besley 2013).

Indeed, returning to the efficacy of the "invisible hand," an important underlying condition is the absence of negative externalities. When the social costs of market activity are not borne by the trading parties in the market—as in many of the examples above—then markets can systematically underappreciate such impacts, absent some other channel through which they are incorporated. Hence, a standard response to the problem of external effects is to call for an active role for government in regulating or taxing activities that impose externalities, as one possible way to internalize their impact.

However, an alternative remedy occurs if market participants voluntarily take into consideration the social impacts of their actions, thereby resulting in a partial or full internalization of external costs. For example, firms may voluntarily incur additional production costs in order to avoid exposing communities where production occurs to harm or risks, and consumers may be willing to pay higher prices for products that mitigate such potential harm. Thus, the notion of individual and corporate "social responsibility," or the willingness to sacrifice profits or personal wealth in pursuit of broader social interest, has recently come into focus as a means to prevent efficiency losses due to external effects (Bénabou and Tirole, 2010).[1] The presence of product categories such as "carbon free," "fair trade" and "cruelty free" in consumer products markets—often associated with higher production costs for firms and prices for consumers—reflects the potential influence of concerns for social impact.

The possibility that market participants voluntarily internalize the external impacts of their actions is also supported by evidence from research on non-market decision making, which regularly documents a willingness to consider the impact of one's actions on others (e.g., Andreoni and Miller, 2002; Fisman, et al., 2007; Cappelen, et al., 2007). The fact that people often show concern for others' welfare in choice contexts such as dictator games (Hoffman, et al., 1994; Engel, 2011) suggests that such concern may exist as well with respect to externalities in market settings. However, there is also considerable evidence, which we review below, indicating that repeated exchange in competitive markets often crowds out or erodes

[1] This notion is, however, far from new. For example, Arrow (1970) called "attention to a less visible form of social action: norms of social behavior, including ethical and moral codes" and suggested "as one possible interpretation that they are reactions of society to compensate for market failures" (p. 22).

concerns with fairness and equality, at least between the *directly* interacting trading parties in the market (Roth, et al., 1991; Franciosi, et al., 1995). The question of whether market exchange and competition similarly eliminate concern with the welfare of externality-bearing third parties, who are uninvolved as buyers or sellers in a market, remains largely an open question.

We report a laboratory experiment showing that socially responsible behavior by firms and consumers in markets can, indeed, mitigate the fundamental problem of negative external effects. Our experiment models a competitive product market, in which sellers post prices and consumers can choose which products to buy, or whether to buy a product at all. Sellers decide on a price and on which type of product they want to offer for sale—either one that produces a large negative externality for a third party or one that does not, with the latter involving higher production costs. Thus, our experiment includes a production technology that allows market participants to avoid the external harm caused by exchange, as long as they are willing to incur the corresponding costs. In a baseline market case, following firms' decisions, consumers observe the set of offered products and then make purchasing decisions from the set of available posted product offers. We allow repetition, in order to obtain a sense of what kind of outcomes arise with experience in the market. The standard equilibrium prediction for these markets is that only the cheaper good, which produces the externality, is traded.

In contrast, we find that the market converges to a stable outcome in which a significant proportion (roughly 45 percent) of products traded cost more to produce, but yield no externality. The prices for such goods are also regularly higher than prices for the externality-producing products, though to a lesser extent than the full additional production cost. Thus, in our markets, both sellers and buyers share, on average, some of the burden for preventing the negative externality. Both manifestations of social responsibility are stable over time. We interpret these findings as evidence that significant and robust preferences over considerations such as social impact, fairness and morality can persist in competitive market exchange.

We also conduct additional variants of the market to test the robustness of social responsibility to varying market conditions. In particular, we study two factors.

First, we study the effect of increased competition between sellers on social responsibility. Specifically, we add supra-marginal firms to the market, which should theoretically have no effect. However, increased competition is often argued to diminish concerns with fairness (Roth, et al., 1991) and, more broadly, is often highlighted as a potentially corrupting influence in economic and market behavior (Shleifer, 2004; Cai and Liu, 2009; Brandts, et al., 2009). In our market, competition does drive down overall prices, thus yielding greater relative surplus for consumers at the expense of firms. However, there is no detrimental effect of increased competition on the degree of concern exhibited toward externality-bearing parties outside of the market. In fact, the market share of products that yield no externality increases slightly under increased firm competition, relative to our market baseline, as does the price premium for the socially responsible product. Thus, instead of decreasing the expression of social responsibility, increased market competition in this case seems to have, if anything, the opposite effect. One possible interpretation

for this finding is that, as competition yields increased surplus for consumers, they become more willing to bear the costs associated with mitigating the externality for third parties.

Second, we consider the possibility that consumers may have limited information about the degree of externality produced by available products, but have the ability to learn about such product characteristics. This reflects the fact that many consumers do not know which firms' products are, for example, environmentally or socially harmful, but that such information is often available if a consumer chooses to acquire it. We study both a case in which the information is free to consumers and one in which acquiring it involves the consumer incurring a small cost. In both cases, we find that the need for consumers to actively acquire product information regarding social impact has only a small effect—though slightly larger when acquiring information is costly—on the expression of social responsibility in the market.[2]

We also conduct a condition that allows us to directly compare the strength of the social concern exhibited by participants in our market experiment with social concern expressed in a comparable individual, dictator-like, choice context. To this end, we present a novel group of subjects *exactly* the same choices as those faced by consumers in the baseline market, with identical monetary consequences for the decision maker and for two other participants (reflecting, implicitly, the roles of sellers and externality-bearing third parties from the market condition). We find that the frequency of choices mitigating the negative social impact on third parties in this individual (non-market) context is only slightly higher than in our market condition. Thus, while, qualitatively, we find that the market yields less socially responsible outcomes than in comparable individual non-market behavior (cf. Falk and Szech, 2013), the effect is not very large.

As a complement to the analysis of aggregate market outcomes, we estimate simple choice models of consumer and firm behavior from our experimental data. For consumers in the market conditions—and individual decision makers in our non-market condition—we estimate a multinomial logit choice model (McFadden, 1974) in which we allow utility to be determined both by a consumer's own material profit (i.e., the value of a product purchase minus the price paid) and by the social impact of a product purchase or choice. This analysis reveals that the choices made by individuals in all conditions of our experiment demonstrate a positive concern for both sources of utility. Thus, consumers in all of our market conditions, as well as individual decision makers in the non-market condition, exhibit concern for social responsibility, which can be modeled as a standard utility-enhancing product attribute. We also study firms' product supply decisions, and find that firms respond sensibly to market conditions—such as consumers' product type choices and relative

[2] Such limited information, along with an apparent desire to remain willfully ignorant to the harmful consequences of one's actions, has been shown to be a factor that significantly diminishes pro-social behavior in many individual choice settings (Dana, et al., 2007; Larson and Capra, 2009). We find limited information to have a much smaller effect in our market context. One possible interpretation for this difference is that the market context already affords those people who would rely on ignorance as a justification for selfish behavior sufficient other justifications to render the impact of default ignorance less important.

prices—but that their behavior also exhibits a persistent concern among some firms for social responsibility.

The remainder of the paper is structured as follows. In the next section, we review some of the related literature. Then, in Section 3, we describe our experimental design. Section 4 presents the results of our market conditions with regard to the market share and price premium of the fair product, while Section 5 presents analyses that use the combined results to estimate models of firm and consumer behavior. Section 6 compares the behavior of consumers in our market conditions to individual allocation choices in a comparable non-market context. Finally, Section 7 concludes and provides a broad interpretation of our combined results.

2. Relation to Previous Literature

Our findings are surprising in light of an extensive literature showing that experimental markets generally converge toward equilibrium predictions in which considerations such as fairness have minimal impact and one side of the market (firms or consumers) captures most or all of the surplus (Smith, 1962; Plott and Smith, 1978; Roth, et al., 1991; Holt, 1995; Franciosi, et al., 1995). This has even been shown in cases where product purchases create negative externalities for other market participants (Plott, 1983). It has thus often been argued that fairness and social considerations are minimally important in market settings. A key distinction between this prior work and our experiment, however, is that the kind of social impact we study deals not primarily with fairness or inequality among directly interacting market participants—such as firms and consumers—but, rather, with fairness toward individuals entirely uninvolved with the exchange process in the market that determines the externality. This is often the case, for example, in situations where production and exchange yield widespread negative social impacts, such as environmental pollution or persistent inequality, or harm to those unable to exert agency, as in the case of forced labor or animal testing. Our experiment creates a simplified version of such settings, in which the behavior of market participants impacts someone uninvolved in the market in which the product is exchanged.[3] We find concerns for the social impact on such passive external individuals to be persistently manifested in market behavior and outcomes.

Our results also contrast with a prominent argument that market exchange crowds out moral values (e.g., Sandel, 2012).[4] Much of the evidence supporting this argument, however, is indirect and does not study the behavior of individuals interacting through markets. For example, experimental findings reveal that the framing of a non-market interaction with market labels and terminology reduces the

[3] In this regard, our experiment also creates parallels between the study of social behavior in markets and the vast literature on dictator games, where the social impact of decision makers' actions are felt by passive parties with no decision making power.

[4] A distinct argument is that the properties of markets may not necessarily eliminate moral considerations from the preferences of market participants, but may make them irrelevant under certain conditions governing exchange (Sobel 2009, 2010; Dufwenberg, et al., 2011). Another related argument is that "repugnance" to certain kinds of market transactions should be accounted for in the use and design of markets for exchange (Roth, 2007).

apparent importance of moral considerations—such as equality and social welfare—among interacting participants (Hoffman, et al., 1994; Ross and Ward, 1996).[5] Similarly, the act of assigning monetary value to "good" behaviors, through prices, has been argued to produce a crowding out of intrinsic motivations for such acts (Frey, et al., 1996; Gneezy and Rustichini, 2000; Mellström and Johannesson, 2008). In psychological research, priming people to think of money, in contrast with similar non-monetary primes, leads to more individualistic and less pro-social behavior (Vohs, et al., 2006; see also, Kube, et al., 2012). Thus, while there is considerable *indirect* evidence of the perverting effect of market exchange—i.e., factors associated with markets appear to diminish the importance of moral motivations—there is little direct evidence on whether moral considerations are truly eroded by market interaction.

One recent study, by Falk and Szech (2013), does study the behavior of participants interacting in bilateral and multi-lateral double-auction markets in a context where, like in our study, market exchange can produce social harm whose impact is not felt by market participants—in their case, the negative social impact is the loss of life of a mouse. They find that repeated market interaction generally yields less socially responsible behavior than one-shot non-market decisions, and that market experience further devalues apparent concern for the external impact of market exchange. This stands in contrast to our experiment, where the magnitude of the difference between market and non-market social concern is much smaller, where the market share for the socially responsible product is stable across time, and where one measure of social concern—the price premium for the socially responsible product—even increases over time.

However, specific features of the design employed by Falk and Szech merit further consideration in understanding better whether markets, in general, erode concerns for social impact. For example, while the extreme nature of the potential externality (the death of a mouse) is an eye-catching and fascinating feature of their design, studying morality in markets with varying and possibly less extreme characteristics is important for understanding many non-laboratory contexts, where tradeoffs are not between money and death, but rather between different distributions of resources or wealth.[6] In this regard, our approach employs a more standard economic methodology by comparing monetary profits for market participants with monetary harm for those affected by a negative externality. This design, more easily suited for future replication and study, also allows easier evaluations of the welfare and efficiency properties of the market. Moreover, while double-auction markets, as employed by Falk and Szech, are a workhorse of experimental economic research (e.g., Smith, 1962), they are often more representative of real-world contexts better described as "bargaining" than many

[5] See, also, Cappelen, et al. (2013), who show that an alternate manner of priming people with a market context produces a small, but statistically insignificant, increase in the propensity to lie.

[6] Furthermore, an extreme consequence such as death may trigger strong negative emotional reactions in individual choice contexts, which are then diminished by market activity. While consistent with the idea that markets diminish moral concern, this might not generally be the case in situations where the externality elicits a less extreme emotional reaction, and where moral considerations are weighted more deliberatively (cf. Greene, et al., 2001).

product or labor markets, where one-sided posted offers are a more typical market structure.[7]

Finally, and perhaps most importantly, in Falk and Szech's experiment there is only one production technology, which necessarily requires the imposition of the negative externality if exchange is to occur.[8] However, many real-world markets are characterized by a multiplicity of production technologies, some of which may create fewer negative externalities than others. Indeed, a valuable characteristic of markets is that, where a preference to employ a technology that limits external harm exists, market incentives and competition are likely to lead to its use. Thus, unlike in the study by Falk and Szech, where market exchange is incompatible with acting in a socially responsible manner, our experimental design allows social responsibility to be manifested in market exchange—as long as the trading parties are willing to bear the necessary costs.

The conclusions of our study lie closer to research suggesting that markets and social or moral considerations are compatible. For example, an alternative perspective to that described above arises from evidence that exposure of developing societies to market interaction facilitates the adoption of pro-social norms, e.g., of fairness and cooperation (Henrich, et al., 2001; Bowles 2011). For example, Henrich, et al. (2010), find that communities with greater degrees of reliance on and integration into markets for exchange—measured, in this case, as the proportion of households' total caloric consumption that is purchased rather than self-produced—also exhibit the most egalitarian behaviors in experimental games. The interpretation is that successful market exchange requires the development of norms of fairness and cooperation that apply to even impersonal interaction between parties. Our study shows, directly, that behavior consistent with such norms can persist as a feature of market exchange.[9]

In this sense, our findings also have some similarity to studies demonstrating that efficiency-enhancing reciprocity between buyers and sellers—as when, for example, contractual incompleteness make trust and trustworthiness necessary for efficient exchange—persists in many kinds of markets (Fehr, et al., 1993; Fehr and Falk, 1999). While the precise nature of these results is very distinct from our work, in which contracts between buyers and sellers are complete and in which market behavior impacts third parties uninvolved with the market, we establish a similar finding that socially responsible behavior can persist in competitive markets.

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[7] Smith (1962) contrasted double-auction markets with a posted offer market, which "was intended to simulate approximately an ordinary retail market. In such markets, in the United States, sellers typically take the initiative in advertising their offer prices, with buyers electing to buy or not to buy rather than taking part in a haggling and bargaining process" (p. 124). Our experiment is intended to model such product markets, where discussions of social responsibility are often focused.

[8] This is also the case in the markets with negative externalities among market participants studied by Plott (1983).

[9] Evidence for the importance of fairness norms in markets also comes from questionnaire survey studies. Kahneman, et al. (1986) report that that any change in offer prices by firms in the short run that is not justified by a cost increase is considered as unfair by consumers. They argue that such fairness norms imply that markets may not clear if a price increase in response to excess demand (e.g., for snow shovels after a snowstorm) is not justified by an increase in supply costs.

3. Experimental Design

3.1 The Market Game

We develop a novel experimental market environment that contains important features of real-world product markets. Firms and consumers can exchange two types of products, one of which imposes a negative externality on a third party. For simplicity, we label the product that produces no externality for the third party ($e = 0$), i.e., the socially responsible product, as the "fair" product and the product that generates a negative externality ($e = 1$) as the "unfair" product.

The production cost of the unfair product is normalized to zero. This product is worth 50 to the consumer, thus generating a surplus of 50 when exchanged. However, exchange of this product imposes a negative externality of 60 on a third party, thus making exchange of this product socially harmful and inefficient, with a net welfare impact of $50 - 60 = -10$. In contrast, the fair product has a production cost of 10 that is borne by the firm, but has no impact on the third party. Thus, exchange of the fair product is efficient, as it generates a net surplus of $50 - 10 = 40$.

Our *Market Baseline* condition consists of six firms, five consumers and five third parties. All players start with 100 units of wealth. Each firm offers a single product, either $e = 0$ or $e = 1$, in a posted-offer market, at a price, p, determined by that firm. Consumers enter the market sequentially (in a randomly determined order), observe the current menu of prices and product types, and either choose a single product offer or reject all available offers. A firm can sell at most one product. Hence, while the consumer who enters the market first can choose among all six product offers, consumers who enter later can only choose from those offers that remain. Since there are six firms but only five consumers, even the last consumer entering the market can choose among at least two product offers. There is, however, always at least one firm that cannot sell its product.

The payoff of each of the five third parties is determined by one of the five possible exchanges between firms and consumers in the market. The purchase of an unfair product by a consumer reduces a third party's payoff by 60 units, while either the purchase of a fair product or a consumer's decision not to purchase any product yield no impact on the corresponding third party's payoff.

Equations (1) to (3) summarize the payoffs in a period. A firm receives $100 + p - 10 \cdot (1 - e)$ if it sells its product, and 100 otherwise. A consumer receives $100 + 50 - p$ if she buys a product, and 100 otherwise. A consumer's payoff thus does not depend on the type of product she buys. The third party's payoff is $100 - 60 \cdot e$, meaning that the third party is only negatively impacted in the case where a consumer and firm exchange an unfair product.[10]

[10] Notice that the production costs (in case of $e = 0$) or the externality (in case of $e = 1$) arise only if a product is sold, not if a product is just offered. This design feature can be interpreted as a "production on demand" technology. We chose this design feature—rather than, perhaps, one in which the externality is created at the time of the product type choice by firms—in order to create a situation in which exchange between buyers and sellers creates the externality. In this regard, our design is similar to that of Falk and Szech (2013).

$$\Pi^{firm} = \begin{cases} 100 + p - 10 \cdot (1 - e) & if\ she\ sells\ her\ product\ at\ price\ p \\ 100 & otherwise \end{cases} \quad (1)$$

$$\Pi^{consumer} = \begin{cases} 100 + 50 - p & if\ he\ buys\ a\ product\ at\ price\ p \\ 100 & otherwise \end{cases} \quad (2)$$

$$\Pi^{thrid\ pary} = \begin{cases} 100 - 60 \cdot e & if\ the\ matched\ consumer\ buys\ a\ product \\ 100 & otherwise \end{cases} \quad (3)$$

Subjects play 24 rounds of the market game in fixed groups (16-person markets) and roles. We eliminate the possibility of cross-period reputation by not showing subjects the ID numbers of other market participants and by randomly ordering the display of product offers in each period. One round is randomly chosen for payment at the end of the experiment.

We introduce an explicit market context in the instructions by giving the three types of roles natural interpretations. Players A are described as "sellers" and Players B as "buyers" and they are told they can "trade" different "types of products" at the offered "prices." Player C is neutrally described as "Player C," and the two types of products are called "product without impact on player C" (in case of $e = 0$) and "product with loss for player C" (in case of $e = 0$). An English translation of the original German instructions for the Market Baseline condition is included in the Appendix.

3.2 Varying Market Characteristics

To study the robustness of the behavior in the Market Baseline condition, we implemented three additional market variants that changed important characteristics of the market. Specifically, we varied the degree of competition between firms in the market, the information that consumers have about the types of available products, and the cost of becoming informed about the characteristics of products.

First, in a *High Firm Competition* condition, we increase the number of firms from six to eight. There are thus always at least three firms in this condition—rather than one in the Market Baseline—that are unable to sell their product offers in each period. Apart from this difference in the number of firms, this condition is otherwise identical to the Market Baseline condition. We expect this increased competition between firms will lead to prices closer to the competitive equilibrium—posted-offer markets typically produce prices above the competitive equilibrium (Plot and Smith, 1978; Ketcham, et al., 1984)—than in the Market Baseline. Our primary focus, however, is on how this increased competition affects the manifestation of social responsibility, e.g., the market share of the fair product.

Second, we conducted two *Limited Information* conditions, in which consumers initially have no information regarding the types of different products. In these conditions, consumers initially only observe the price of each available product, though they are aware that the products might vary based on their social impact on the third party. In both cases, we give consumers the ability to become informed—i.e., to learn the social impact of all available products. The two conditions vary how costly it is for consumers to acquire such information.

In the *Limited Information (Free)* condition, the types of all products ($e = 0$ or $e = 1$) are initially unknown to consumers. A consumer can, however, reveal the types of products at no monetary cost, simply by clicking a button. A consumer who

enters the market thus only sees the prices of the remaining products but not the types of these products. A consumer then has the option to purchase a product without ever learning its type (recall that the monetary value of the product to the consumer does not depend on the type of the product) or to reveal the product types, first, and then make a purchasing decision. Apart from the fact that consumers do not learn the types of products by default when entering the market, this condition is identical to the Market Baseline. However, it allows us to identify whether an alternative, more natural, informational default affects behavior and market outcomes.

Finally, the *Limited Information (Costly)* condition is identical, apart from the fact that a consumer in this condition has to pay a small cost, of 1 unit, if she chooses to reveal the types of the available products before making a purchasing decision. This condition adds the realistic feature that it is costly for consumers to become informed about the social impact of their products, perhaps discouraging many of them from doing so, or providing a rationalization for possible harm inflicted on the third party.

3.3 The No Market Condition

In order to provide a non-market benchmark against which to compare the behavior and outcomes in our market conditions, we conducted a *No Market* condition. This condition mimics the standard distributional decision tasks (i.e., dictator games) typically used to measure fairness and concerns for social impact in individual choice experiments.

Our design creates a precise parallel between the monetary consequences of the "product" choices made by consumers in a given round in the Market Baseline and the "allocation" choices made by decision makers in our No Market condition. To achieve this, we present each decision maker in the No Market condition with the *exact* sequence of choices faced by a "yoked" consumer in the Market Baseline condition. That is, for each consumer in the Market Baseline, who faced a sequence of 24 menus of product offers, we have a decision maker in the No Market condition, who faces a sequence of 24 identical, in monetary terms, neutrally framed allocation choices.[11]

We implement three-person groups (players "A," "B," and "C"), in which players B (corresponding to "consumers" in our market conditions) choose between different allocations of payoffs among all three players, as in a three-person dictator game. Players A and C are thus inactive in this condition. The assignment of subjects to roles is fixed for the 24 rounds. One of the 24 rounds of the No Market treatment is randomly chosen to determine payoffs at the end of a session.

[11] For example, suppose a consumer in Market Baseline can choose between two different products in a given round: one fair product at price, $p = 30$, and one unfair product at price, $p = 15$. Recall that there is also always an option not to buy a product at all. Then the corresponding choice options for player B in the No Market condition in the respective round are the following three allocations: either 120 for player A $(100 + 30 - 10)$, 120 for player B $(100 + 50 - 30)$, and 100 for player C $(100 - 0)$, or 115 for player A $(100 + 15 - 0)$, 125 for player B $(100 + 50 - 15)$, and 40 for player C $(100 - 60)$, or 100 for each player.

While the Market Baseline condition includes various features of market contexts—endogenously determined choice sets, contextual labels such as "prices," "products," "buyers" and "sellers"—these are absent from the No Market condition. For example, instructions in the No Market condition (see Appendix) provide no interpretation for the roles of participants "A," "B," and "C," and instead include descriptions such as, "Player B," who can choose among "allocations," not product offers. Subjects are also not told how the allocations were generated but instead are simply told that they will see a given set of possible allocations in each round. Thus, rather than attempting to understand how variation in one such factor influences social concern, we use this design primarily to compare how individuals confront tradeoffs between personal benefits and the welfare of others in two very distinct settings: neutrally framed individual choice contexts, similar to the widely studied dictator game, and in a context designed to mimic product markets.

3.4 Predictions

The standard economic assumptions of self-interest and rationality yield the same prediction for all the market conditions: consumers purchase only the unfair product, which is traded at a price of zero.[12] The resulting outcomes are maximally inefficient, since each unit of the unfair good traded results in a net social loss.

Our experiment also allows the possibility of socially responsible behavior, reflected in market share and prices. If concern for social impact is a persistent characteristic of market participants' preferences, then we expect a positive and constant market share for the fair product.[13] Moreover, it is reasonable to expect some burden of the additional production cost of the fair product to be borne by socially conscious consumers, reflected in a price premium for such products.[14]

3.5 Session Overview and Number of Observations

We conducted 7 markets of the Market Baseline condition, across 5 sessions.[15] Of the 112 subjects who participated in the Market Baseline, 42 subjects were in the role of a firm, 35 in the role of a consumer, and 35 in the role of a third party. We conducted 6 markets, each, of the High Firm Competition, Limited Information (Free), and Limited Information (Costly) conditions; this was done in 4 separate sessions for each condition. Thus, 108 subjects participated in the High Firm

[12] In experimental posted-offer markets similar to those we use here, prices often remain above the competitive equilibrium, with only slow convergence. Comparisons with double auction markets suggest that this deviation from equilibrium price is not driven by fairness concerns but by the firms' power to post prices (Plot and Smith, 1978; Ketcham, et al., 1984). Therefore, even under the assumption of self-interest, we may observe prices above zero.

[13] We do not propose a formal model of social responsibility in this paper. However, as we show in the Appendix, a straightforward application of a standard model of social preferences (Fehr and Schmidt, 1999) to our setting reveals that firms and consumers concerned with fairness and inequality are willing to pay additional costs for socially responsible products that do not harm the third party.

[14] Theoretically, it is possible for the entire burden of social responsibility to be borne by firms, as long as these are sufficiently concerned with social impact (see Appendix). However, if consumers share *any* of the additional production costs for fair products, then this willingness to pay for socially responsible goods will be reflected in a price premium.

[15] In some sessions of our market conditions we had a sufficient number of subjects to run two independent markets in parallel; in others we conducted a single market only.

Competition condition and 96 subjects participated in each of the Limited Information conditions. We also conducted 3 sessions of the No Market condition, with 105 subjects in total. Thus, altogether 517 subjects participated in our experiment. Table 1 gives an overview of our treatment conditions and the number of observations.

Table 1. Session Overview and Number of Observations

Treatment	Markets	Firms (Participant A)	Consumers (Participant B)	Third Parties (Participant C)
Market Baseline	7	42	35	35
High Firm Competition	6	48	30	30
Limited Information – Free	6	36	30	30
Limited Information – Costly	6	36	30	30
No Market	-	35	35	35

3.6 General Procedures

All sessions took place at the computer laboratory of the Department of Economics at the University of Zurich. The study was conducted through computer terminals, using the software z-Tree (Fischbacher, 2007). Subjects were mainly students from the University of Zurich and the Swiss Federal Institute of Technology (ETH) in Zurich. Students majoring in economics or psychology were not eligible to participate. We conducted a between-subjects design; that is, each subject participated in only one condition.

Before subjects entered the lab, each subject randomly drew a place card that specified at which computer terminal to sit. The terminal number determined a subject's role as either firm (participant A), consumer (participant B), or third party (participant C). Subjects received written instructions, including comprehension questions that had to be answered correctly before a session could begin. A summary of the instructions was read aloud by the experimenter to ensure common information.

Sessions lasted about 1.5 hours. Payoffs from the experiment, denominated in "points," were converted into money at the rate of 10 points to CHF 2.50 (CHF 1 ≈ $ 1 at the time of the experiment) at the end of a session. On average, subjects earned about CHF 42.5, which includes a show-up fee of CHF 15.

4. Market Shares and Prices

In discussing the results, we proceed as follows. In this section, we first present the results of our Market Baseline condition, to identify the extent to which concerns for the welfare of third parties are reflected in market outcomes, such as market shares and relative prices for the two kinds of products. Then, we study how varying

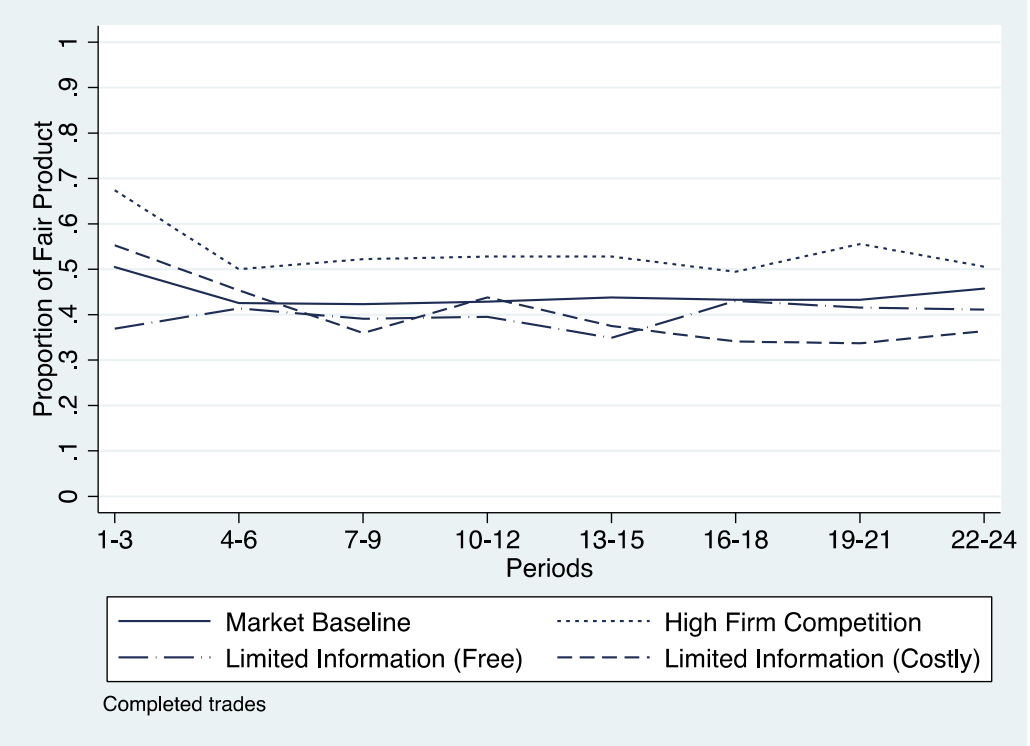
market conditions, including increased firm competition and limited consumer information, influence socially responsible market behavior.

In Section 5, we shift our attention from aggregate outcomes to the individual behavior of consumers and firms. Finally in Section 6, we address the issue of whether concerns for social impact are diminished by markets, relative to the concern observed in non-market individual choice contexts, by comparing consumers' choices in our Market Baseline condition to individual allocation choices in our No Market condition.

4.1 Market Baseline

In 99 percent of cases (831 of 840 consumer periods), consumers purchased a product. Therefore, our analysis will primarily focus on the realized purchases by consumers; unless otherwise noted, we ignore cases in which a consumer made no product purchase.

Figure 1. Fair Product Purchases across Varying Market Conditions



The solid line in Figure 1 displays the proportion of fair products purchased by consumers across time in the Market Baseline condition. This statistic identifies how often the externality on third parties was mitigated and, therefore, corresponds to the efficiency of the market. To smooth random variation across periods, we report data aggregated across three-period blocks.[16]

[16] A potentially different measure of the fair product share in the market, not reported in the graph, is the proportion of fair products offered for sale by firms. While this could, potentially, differ from the proportion of fair products actually bought—if, for example, one kind of product was systematically left unsold—the data reveal no substantive difference: the two proportions never differ by more than 3 percent in any three-period block.

The figure reveals a large and stable share of fair products in the Market Baseline condition. The share of fair products is 50 percent in the first three periods, then decreases slightly, but remains between 42 and 46 percent in all remaining three-period blocks. Thus, as measured by market share, we observe a persistent manifestation of socially responsible behavior in market exchange, with almost half of the realized exchanges demonstrating an apparent concern for avoiding the imposition of the externality.

To provide a statistical basis for the claim that the proportion of fair products does not decrease over time, Table 2 reports probit regressions, with subject random effects, of consumers' product choices. All three models include period as an explanatory variable, and the coefficient for this variable is never statistically significant. Models 2 and 3 restrict the data to those periods in which a consumer saw both kinds of products (remember that the sequential nature of the market meant that consumers acting later saw subsets of the original set of products offered). Again, there is no significant time trend in this data.

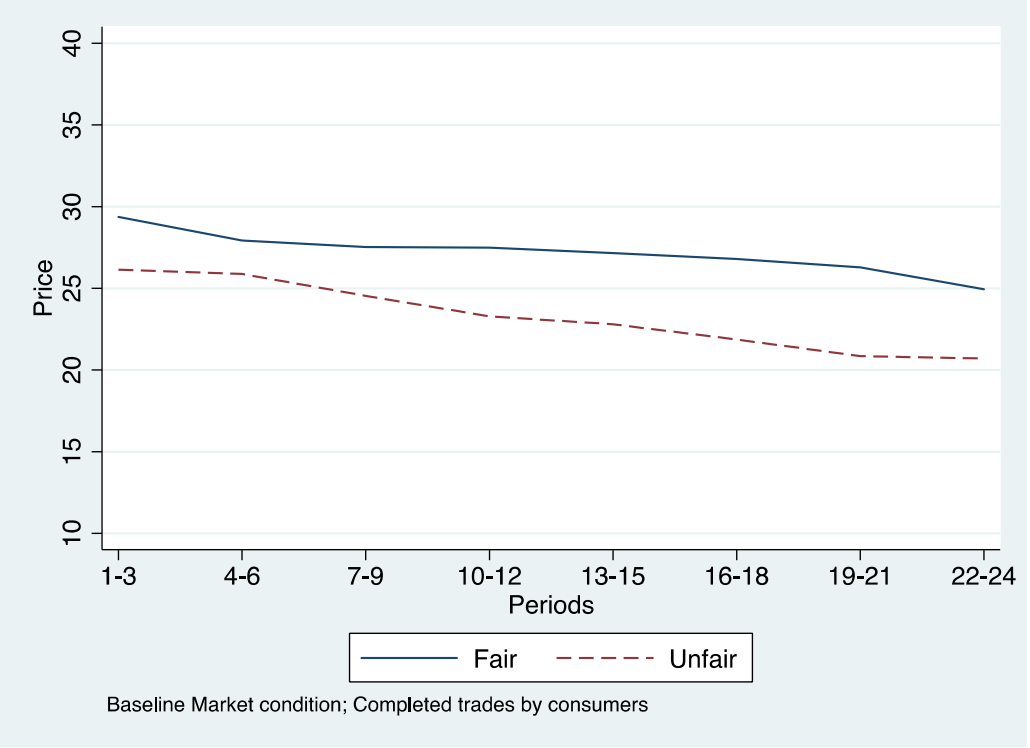
Table 2. Random-effects Probit Regressions of Fair Consumer Product Choice in Market Baseline Condition

	All periods	Consumer saw both kinds of products	
	(1)	(2)	(3)
Period	-0.007	-0.013	0.014
	(0.008)	(0.010)	(0.022)
Low price of fair product			-0.403***
			(0.074)
Low price of unfair product			0.385***
			(0.063)
Constant	-0.009	0.180	2.275
	(0.211)	(0.248)	(1.826)
Observations	831	621	621
Number of subjects	35	35	35

Omits the nine cases in which a consumer made no product purchase
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Model 3 reveals that consumers respond sensibly to market prices: they are less likely to purchase the fair product as the lowest price at which one is available increases and, conversely, they are more likely to buy a fair product as the lowest price at which an unfair product is available increases. In Section 5 we conduct a more thorough analysis of consumer's choices and of the importance that consumers place on prices, i.e. on their own material payoff, versus the social impact of a product, i.e. the material payoff of the third party.

Figure 2. Prices by Product Type in Baseline Market Condition



Consumers' concern for social impact is also reflected in a persistent price difference for the two types of products. Figure 2 shows the average purchase prices for the fair and unfair products over time. Two trends are clear from the figure. First, there is a general slight decreasing trend in prices over time. This is consistent with the competitive advantage held by buyers in this market, which is increasingly manifested in overall prices over time.[17] Second, however, there is a persistent price difference for the two types of products. Products that produce no social harm cost more than socially harmful products throughout the experiment. This price premium increases over time, from 2.7 in the first six periods to 4.8 in the final six periods. By the end of the experiment, when the price premium is approximately 5 price units, the 10-unit cost of mitigating the externality is borne roughly equally by sellers and buyers. This is also illustrated by the solid line in Figure 3, which shows the price premium for the fair product—i.e., the mean price of the fair product minus the mean price of the unfair product—in the Market Baseline condition.

As a complement to the above qualitative observations, Table 3 reports regressions that study how prices vary over time and by product type. Model 1 reports estimates using data from the Market Baseline condition and reveals that the general price decrease across time is significant, that the fair product sells at a

[17] In posted-offer markets, offer prices tend to be above equilibrium and convergence to the competitive equilibrium is slower compared to double-auction markets (Plot and Smith, 1978; Ketcham et al., 1984). Our market experiment reproduces this finding. Note that the trade volume corresponds, almost perfectly, to the equilibrium prediction—i.e., there are very few missed trading opportunities. Our High Firm Competition condition, which we analyze later, obtains prices closer to the competitive equilibrium prediction. A comparison between this condition and the Market Baseline provides a test how social responsibility is affected as price behavior converges further toward equilibrium.

significantly higher price, and that the gap between the two prices increases over time.

Result 1: *Outcomes in the Market Baseline condition reveal a significant and stable concern for the welfare of the third party, reflected both in market share and relative prices for the two kinds of products.*

Figure 3. Price Premium for the Fair Product across Varying Market Conditions

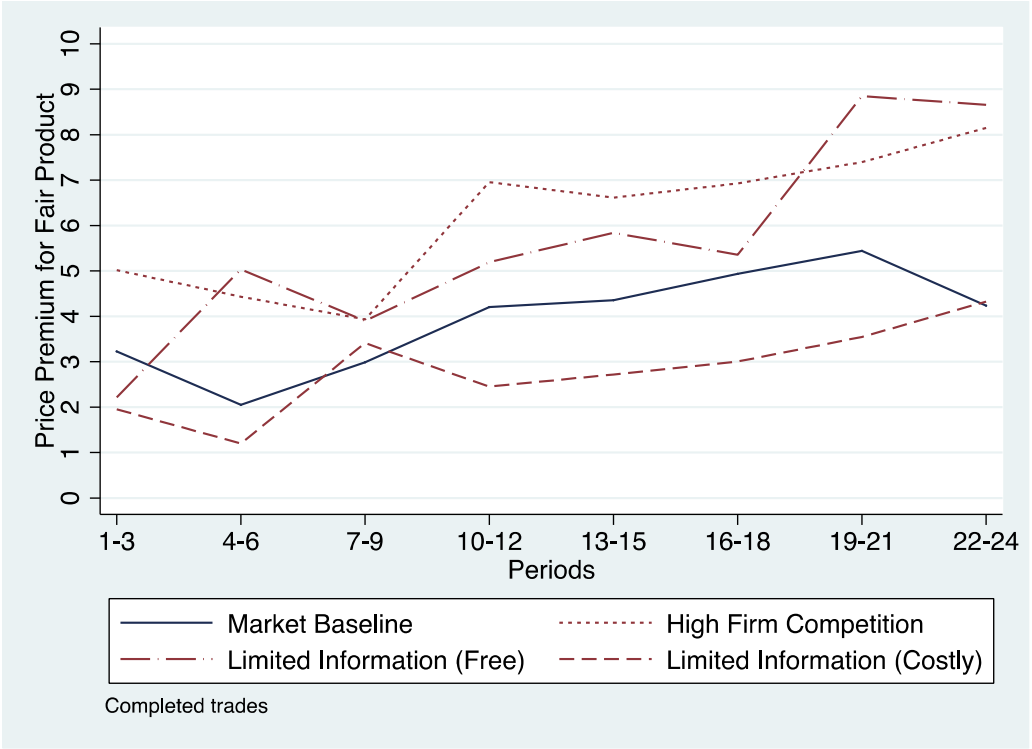


Table 3. Random-effects Regressions of Prices by Product Type

	Market Baseline	High Firm Competition	Limited Info. (Free)	Limited Info. (Costly)
	(1)	(2)	(3)	(4)
Period	-0.283***	-0.474***	-0.574***	-0.342***
	(0.037)	(0.066)	(0.051)	(0.055)
Fair Product	2.401***	3.328***	3.121***	1.202
	(0.651)	(0.846)	(1.153)	(0.934)
Period X	0.108**	0.190**	0.192**	0.103*
Fair Product	(0.050)	(0.079)	(0.078)	(0.062)
Constant	26.881***	21.812***	28.771***	30.240***
	(0.574)	(0.754)	(0.791)	(0.989)
Observations	831	711	695	702
# subjects	35	30	30	30

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 Increased Firm Competition

We next consider how the concern for social impact that we observe in the Market Baseline condition is affected by varying market characteristics. Our second market condition increases the number of firms, from 6 to 8, thereby increasing competition and likely putting downward pressure on prices. We use this condition to study how such increased competition and closer approximation to competitive equilibrium price levels affect the concern for social impact reflected in market outcomes.

Returning to Figure 1, the dotted line shows that the High Firm Competition condition yields a slightly *higher* frequency of fair products, relative to the Market Baseline. Specifically, the overall frequency of fair products traded increases from 44 percent to 54 percent. Models 1 and 2 in Table 4 report the results of random-effects probit regressions of the type of product purchased, comparing the Baseline Market and High Firm Competition conditions. Model 1 shows there to be no significant differences between the Market Baseline (omitted category) and High Firm Competition condition, in terms of overall fair product market shares over the course of the experiment. Model 2 additionally tests for differences in condition-specific time trends, again revealing no significant treatment effects, neither in levels nor in time trends. Therefore, under increased firm competition, we observe persistent socially responsible behavior reflected in the market share of the fair product, which is slightly, but statistically insignificantly, higher than in the Market Baseline.

Table 4. Random-effects Probit Regressions of Fair Consumer Product Choice in Market Baseline, Alternative Market Conditions, and No Market Treatment

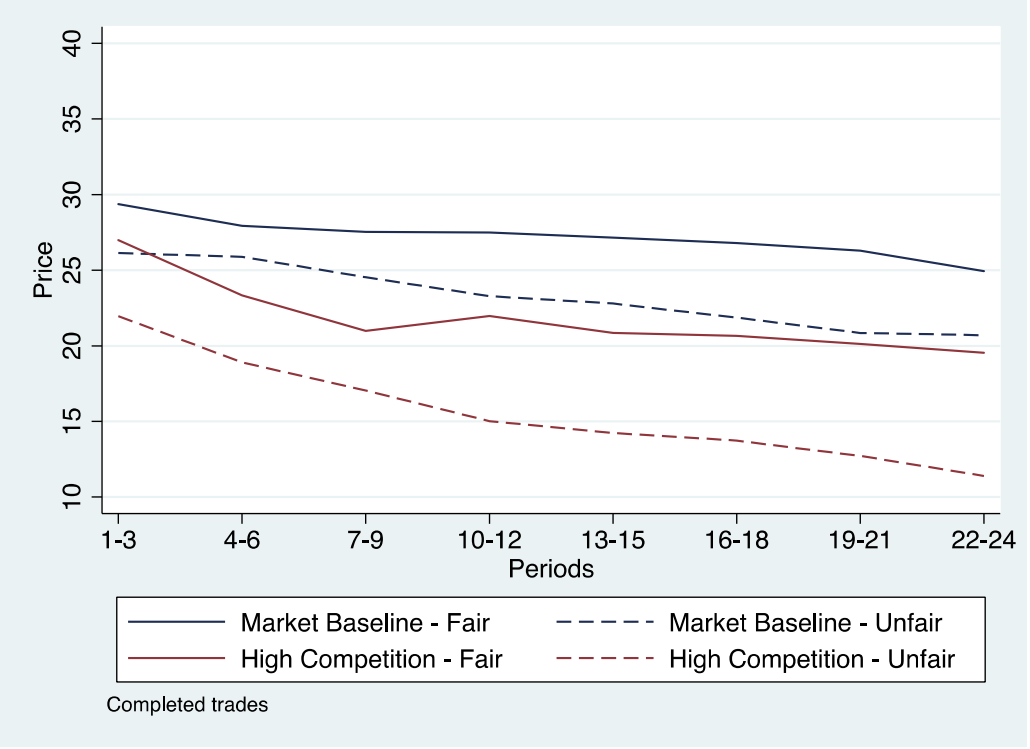
	Baseline vs. High Firm Competition		Baseline vs. Limited Info (Free)		Baseline vs. Limited Info (Costly)	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment	0.373	0.494	-0.314	-0.471	-0.135	0.167
	(0.359)	(0.333)	(0.374)	(0.378)	(0.307)	(0.308)
Period		-0.007		-0.007		-0.007
		(0.008)		(0.008)		(0.008)
Period X Treatment		-0.010		0.013		-0.025
		(0.013)		(0.016)		(0.017)
Constant	-0.085	-0.001	-0.083	0.002	-0.098	-0.014
	(0.230)	(0.209)	(0.232)	(0.211)	(0.225)	(0.204)
Observations	1,542	1,542	1,526	1,526	1,533	1533
# subjects	65	65	65	65	65	65

Omits cases in which consumers made no product purchase
Robust standard errors (clustered by subject) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

We also observe the price premium for the fair product that we found in the Market Baseline condition. Figure 4 presents prices for the fair and unfair products,

in both the Market Baseline and High Firm Competition conditions. Reflecting basic economic forces, increased firm competition clearly has an effect on prices, with lower prices for both types of products than in the Market Baseline.

Figure 4. Prices by Product Type in Baseline and High Competition Conditions



More importantly, for our purposes, the figure reveals that the price difference for the two types of products persists under High Firm Competition and, if anything, is slightly greater; this is also apparent in the dotted line in Figure 3. With prices converging toward the competitive equilibrium, the price premium of the fair product must eventually reflect the cost difference, if a firm wants to cover its cost of production. That is, in competitive equilibrium, where the price is zero for the unfair product, firms must charge a price premium of at least ten for the fair product—otherwise they are strictly worse off selling the fair product than not trading at all. This is one likely reason for why we might observe an increasing price premium for the fair product as the price for the unfair product decreases, i.e., relative to the Market Baseline condition. Importantly, however, many consumers are willing to pay the greater price premium for the fair product, which is revealed by the slightly increased market share for this product. Thus, despite market prices being closer to the competitive equilibrium prediction in the High Firm Competition condition, socially responsible behavior is not crowded out by increased competition.

Returning to Table 3, in Model 2, we see that the lower prices with high competition are reflected in the smaller coefficient for the constant term, relative to the Market Baseline. We also observe the persistent price premium for fair products, reflected in the positive and significant coefficient for that variable and for the

interaction term with Period, both of which are higher under High Firm Competition than for the Market Baseline condition.[18]

> **Result 2:** *Increased firm competition lowers prices relative to the Market Baseline, i.e. prices are closer to the competitive equilibrium prediction. Nevertheless, outcomes in the High Firm Competition condition reveal a significant and stable concern for the welfare of the third party, reflected both in market share and relative prices for the two kinds of products. Socially responsible behavior is even slightly, but statistically insignificantly, higher under High Firm Competition, relative to the Market Baseline.*

4.3 Limited Consumer Information

We next analyze the case in which consumers initially possess limited information about the characteristics of the different available products. Specifically, while consumers always observe each product's price, they are not initially informed about a product's social impact, i.e., whether it is fair or unfair. However, they always have the opportunity to acquire such information. Our two Limited Information conditions vary whether such information is Free or Costly, in which case consumers must pay a small cost to become informed.

The dashed lines in Figure 1 present the frequencies of fair product purchases in the two Limited Information conditions. Introducing Limited Information decreases the proportion of fair products traded, but only slightly. In particular, under Limited Information, the overall frequency of fair products traded across all periods decreases to about 40 percent, relative to 44 percent in the Market Baseline; this proportion, when considering all periods, is the same regardless of whether information is free or costly. Looking only at the second half of the experiment, where time trends are fairly flat, the frequencies of fair products are ordered in the manner one would expect—highest in the Market Baseline, then with Free Limited Information and lowest under Costly Limited Information—but with differences that are not very large in magnitude.

To statistically test the effect of limited consumer information on product market shares, we return to the treatment-effect comparisons in Table 4. Models 3 to 6 provide a comparison of the Market Baseline (omitted category) with the two Limited Information conditions. Models 3 and 5 show that there are no significant differences between fair product market shares in the Market Baseline and either of the two Limited Information conditions. Models 4 and 6 additionally show that there are also no significant differences in time trends. These results confirm that the

[18] Nesting the regressions in Models 1 and 2 reveals that the effect of increased firm competition on overall price levels is significant: prices are significantly lower with High Firm Competition. The coefficients measuring the difference in price premiums between the Market Baseline and High Firm Competition conditions—i.e., High Firm Competition X Fair Product and High Firm Competition X Period X Fair Product—are both positive, but neither is statistically significant. However, as Figure 3 and Table 3 indicate, the difference between the price premiums increases over time. Indeed, using this nested model to test the restriction that, after t periods, the two price premiums are statistically identical rejects equality in all periods, $t \geq 6$. (More precisely, using the nested model, we test the restriction that, (High Firm Competition X Fair Product) + t * (High Firm Competition X Period X Fair Product) = 0, which is rejected at $p < 0.05$ ($\chi^2(1) > 4.01$) for $t \geq 6$).

proportions of fair products are stable and quite similar between the Baseline Market and the two Limited Information conditions.

The persistent concern for the welfare of the third party is again also reflected in the relative prices of the two types of products. The two dashed lines in Figure 3 show an increasing price premium for the fair product in both Limited Information conditions.[19] Returning to Table 3, Models 3 and 4 present coefficient estimates for random-effects regressions of price on product type and across time for the two Limited Information conditions. The price premium for the fair product is statistically significant throughout the experiment and significantly increasing for Free Limited Information, reflecting an identical pattern to that in the Market Baseline. Under Costly Limited Information, the price premium increases significantly over time, but the overall difference only becomes statistically significant after a few periods.[20] Thus, in both conditions with limited consumer information, we observe a persistent and statistically significant difference in the prices of the two types of products after the initial periods of the experiment.

> **Result 3:** *Outcomes in both Limited Information conditions reveal a significant and stable concern for the welfare of the third party, reflected both in market shares and in relative prices for the two kinds of products. Relative to the Market Baseline, the concern for the welfare of the third party is slightly reduced, though not generally to statistically significant levels, when acquiring product information is costly.*

In the Limited Information conditions, we can also study information acquisition decisions by consumers. Across the entire experiment, consumers in the Limited Information (Free) condition acquired information about product types 73 percent of the time. Consistent with basic economic intuitions, consumers in the Limited Information (Costly) condition acquired this information less frequently, 42 percent of the time. Note that this latter figure is close to the overall proportion of fair product purchases in the Limited Information (Costly) condition, 40 percent, suggesting that those consumers who acquire costly information use it to purchase fair products. The frequencies of information acquisition are also fairly stable across time.[21]

Information acquisition appears instrumental, as reflected in Figure 5, which shows the type of product purchased, conditional on consumers' information

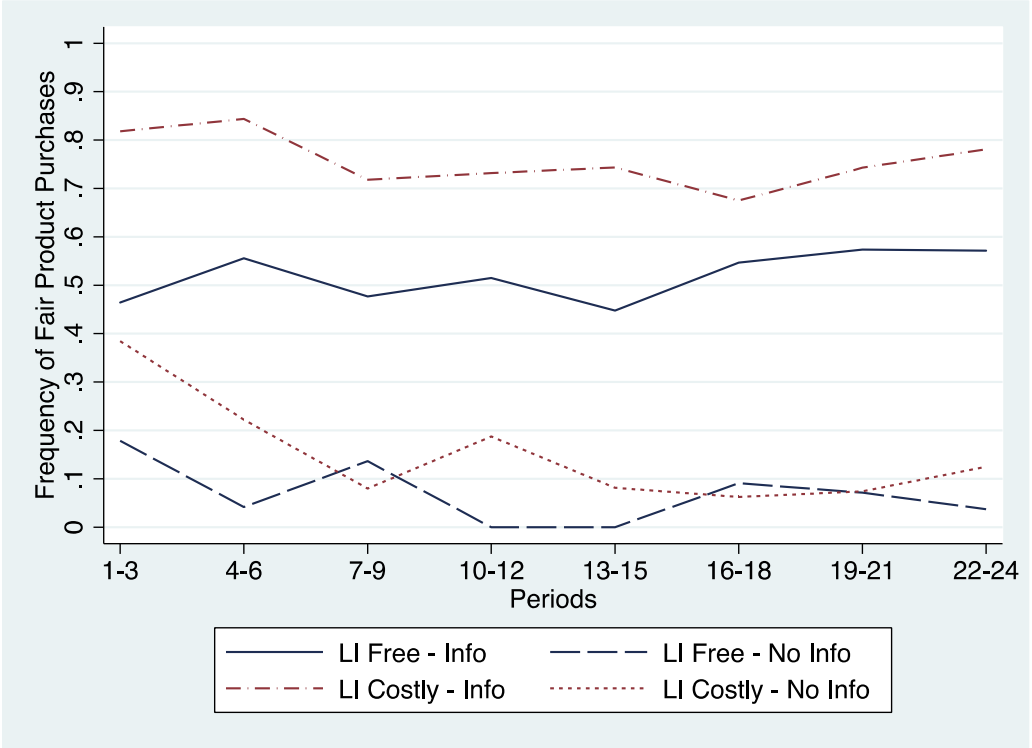
[19] Graphs showing price levels, separately, for the two types of products in the two Limited Information conditions are presented in the Appendix. We omit this figure here for space considerations.

[20] Specifically, statistical rejection of the condition that, *Fair Product + t * Period X Fair Product = 0*, based on the estimates in Model 3, reaches a level of significance of $p = 0.05$ ($\chi^2(1) = 3.77$) in period $t = 3$. The weaker effect in the Limited Information (Costly) condition is consistent with the intuitive notion that prices are less likely to reflect product attributes when consumers are less well informed about such attributes. This is also consistent with our analysis, below, of consumers' information acquisition decisions.

[21] If we consider all 8 three-period blocks, the frequencies vary between 66 percent and 79 percent in the Limited Information (Free) condition and between 36 and 47 percent in the Limited Information (Costly) condition. Moreover, random-effects probit regressions of information acquisition reveal no significant relationship with period in either condition.

acquisition decisions. In both Limited Information conditions, consumers who do not acquire information typically end up purchasing unfair products, particularly after the first few periods.[22] Meanwhile, a large majority of consumers who pay for information purchase fair products (see the line labeled, "LI Costly – Info"), despite the fact that fair products are not always available. Not surprisingly, the proportion of consumers who acquire fair products following the acquisition of free information is lower—likely reflecting indifference between having and not having the information or curiosity without the intent to act on the obtained information.

Figure 5. Product Purchases Conditional on Consumer Information Acquisition



Result 4: *The frequency of information acquisition by consumers is generally stable over time and higher for free information than when information is costly. Consumers' information acquisition appears instrumental, in that most consumers who acquire information purchase fair products (especially when it is costly), while those who do not acquire it almost always purchase unfair products.*

5. Individual Consumer and Firm Behavior

Our analysis thus far has focused on aggregate market outcomes—product shares and prices—as a way of studying concern for the welfare of a non-participant in the market, potentially affected by a negative externality. Across all four market

[22] While such consumers do not necessarily know which type of product they are purchasing, they almost always purchase the product available with the lowest price, which is typically an unfair product.

conditions, we find what appears to be a persistent concern for fairness; markets produce substantial quantities of the fair product and prices reflect a persistent, and often increasing, premium for these products that many consumers are willing to pay.

We next shift our attention from aggregate market outcomes to the individual behavior of consumers and firms. If market outcomes truly reflect socially responsible behavior, then such concerns should show up as part of a "sensible" dimension of the decision making of market participants. We first study the behavior of consumers across our experimental conditions, to observe whether they appear to value concern for the well being of the third party in a reasonable manner. Specifically, we ask whether the social impact of products can be described as a typical product attribute and incorporated into a standard model of consumer choice, and whether the apparent concern held by consumers for this attribute is similarly prevalent across different market conditions. We also explore the behavior of individual firms, to determine whether they respond to market conditions in a reasonable manner. Aside from providing insights into the preferences and decisions of consumers and firms, this analysis also helps us address the possible concern that the non-trivial market shares for the socially responsible product that we document earlier arise primarily from confusion or random behavior.

5.1 Consumer behavior

To study consumer behavior, we assume that individuals potentially care both about their own material payoff and about the social impact of their product choice—i.e., whether or not it produces an externality for the third party. A simple way to capture such preferences is with a linear utility function of the form, $u = \beta x + \gamma y$, where β represents the weight that consumers place on their own monetary payoff (value of the product minus the price paid), indicated by x, and γ captures their concern for their social responsibility toward the third party, whose payoff is indicated by y. Thus, for example, consumers with $\gamma = 0$ care only about buying the product at the lowest price, while consumers for whom $0 < \alpha\beta = \gamma$ are willing to sacrifice up to α units of own wealth for a one unit increase in the third party's wealth. For simplicity, we assume that consumers do not care about the firm's wealth.[23]

We estimate the weights in the above utility specification, using the conditional logit choice model specified by McFadden (1974). The model considers each of the K alternatives available to a buyer in a period (where, including the "no purchase" option, $3 \leq K \leq 7$ in all conditions except for High Firm Competition, where $5 \leq K \leq 9$) and uses the realized choices from each set of alternatives to

[23] We do so for a couple of reasons. First, collinearity between consumer, firm and third party profits limits our ability to estimate linear model parameters if we include concern for the seller. Second, prior experimental evidence suggests that fairness between market participants is often extinguished in repeated market exchange (Kachelmeier, et al., 1991; Roth, et al., 1991; Francoisi, et al., 1995). Indeed, we confirm this to generally be the case in our data: when we conduct the estimation in Table 5, replacing third party profits with firm profits, the weight on the firm's profits is statistically significant at $p < 0.05$ only in the regression for the No Market condition (see Section 5). This likely reflects the feature of our design that the No Market condition is defined as a distributional choice between the decision maker and two other (passive) individuals, while the active role of sellers in the market context decreases the buyers' concerns for the sellers' payoffs, as in prior market experiments.

estimate weights on the two utility components, assuming extreme-value (logit) random utility errors.

Models 1–7 in Table 5 report the coefficient estimates for β and γ, both separately by condition and with condition-specific interaction terms to measure departures in β and γ from the Market Baseline.[24] The estimated models also include case-specific variables identifying the propensity for subjects to make different choices (e.g., select the "no purchase" alternative) across periods and with varying individual characteristics—gender, age and university affiliation.[25]

Table 5. Estimated Weights for Consumer Utility Model

	Baseline Market	High Firm Comp.	Baseline & HF Comp.	Limited Info (Free)	Baseline & LI (Free)	Limited Info (Costly)	Baseline & LI (Costly)	No Market	Baseline & No Market
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Consumer Earnings (β)	0.372*** (0.062)	0.385*** (0.090)	0.420*** (0.057)	0.422*** (0.057)	0.414*** (0.049)	0.574*** (0.100)	0.452*** (0.060)	0.307*** (0.053)	0.389*** (0.047)
Third Party Earnings (γ)	0.033*** (0.006)	0.040*** (0.009)	0.036*** (0.006)	0.036*** (0.006)	0.035*** (0.006)	0.024*** (0.005)	0.038*** (0.006)	0.038*** (0.006)	0.033*** (0.006)
Consumer X Treatment			-0.080* (0.047)		-0.028 (0.033)		0.000 (0.054)		-0.084** (0.037)
Third Party X Treatment			0.000 (0.009)		-0.002 (0.009)		-0.018** (0.008)		0.005 (0.008)
Observations	4,205	5,042	9,247	3,630	7,835	3,616	7,821	4,205	8,410
Cases	840	720	1560	720	1560	720	1560	840	1680

Robust standard errors (clustered by subject) in parentheses
*** p<0.01, ** p<0.05, * p<0.1
The model includes period, gender, ln(age) and university affiliation as (unreported) case-specific (intercept) terms.

Looking first at the condition-specific models (1, 2, 4, and 6), several patterns are apparent. First, consumers care both about their own monetary payoff (β > 0) and about the welfare of the third party (γ > 0). This is true in every condition, with both coefficients always highly statistically significant. Thus, the apparent

[24] Specifically, Models 1, 2, 4, and 6 use only data from the relevant condition. Models 3, 5, and 7 additionally include data from the Market Baseline; the "Treatment" interactions in these regressions identify deviations for the coefficients in that specific treatment condition from those estimated for the Market Baseline.

[25] The labeling of the different product options is irrelevant in our experiment (product choice options were unlabeled and were presented in random order), except for the option to not purchase a product in a period (which was always available). Therefore, we constrain the intercepts for all "purchase" decisions to be equal. The intercepts reveal that consumers tended to make the no-purchase option more frequently later in the experiment and as they reported an older age. As we saw earlier, however, selecting not to make a product purchase is generally infrequent. Omitting these intercept terms does not substantively change the results in the table.

social concern that we observe in aggregate market outcomes is also apparent in the individual behavior of consumers.

The ratio of the two coefficients can be interpreted as the relative concern that consumers place on their own payoff versus the payoff of the third party. These ratios are generally fairly stable across conditions, ranging from 9.6 (High Firm Competition) to 11.7 (Limited Information (Free)), with the exception of Limited Information (Costly), where the ratio is much higher (23.9). Thus, when consumers have limited information about the social impact of their purchases and have to pay for such information, their purchasing behavior reflects decreased concern for the welfare of the third party.[26] This decreased concern in the Limited Information (Costly) condition is also reflected in the negative and statistically significant coefficient for the interaction term, Third Party X Treatment, in Model 7.

For the High Firm Competition condition (Models 2 and 3), the negative coefficient for the interaction term, Consumer X Treatment, in Model 3 reflects a decreased concern for own payoff, relative to that of the third party, with respect to the Market Baseline. Thus, our earlier observation that social responsibility appears to be slightly higher in this condition (see Figures 1 and 3) is also reflected in the behavior of individual consumers.

> **Result 5:** *Consumer's purchasing behavior reflects concern for both the price and the social impact of the product, in all market conditions. Social concern among consumers, relative to self-interest, is greater in the High Firm Competition condition and lower in the Limited Information (Costly) condition than in the Market Baseline condition.*

5.2 Firm behavior

We also study the decisions made by individual firms regarding which type of product to produce in a period. Table 6 reports the results of random-effects probit regressions, using as the dependent variable whether a firm chose to offer a fair (1) or unfair (0) product in a period. The regressions include data from all four market conditions.

The coefficients for the variable Period shows that there is no significant general time trend in the kinds of products offered by firms, in any specification. The variable, *Offered Fair Product*$_{t-1,Firm}$, identifies whether the specific firm offered a fair product in the previous period. The positive and statistically significant coefficient suggests a tendency to repeat the product choice from the prior period. This is consistent with a firm-specific propensity to either offer fair or unfair products across periods; we document such firm-level heterogeneity more precisely in the next section.

[26] In principle, it is possible to estimate a model that includes the endogenous information acquisition decision, incorporating the relevant cost. However, estimating such a model with our data requires making assumptions about the beliefs held by consumers regarding the characteristics of different products, based on observed prices. Given the necessarily *ad hoc* nature of such assumptions, we limit our analysis to a comparison of product purchases based on the known (to the experimenter) characteristics of products and ignore the (small) utility implications of information acquisition in the Limited Information (Costly) condition.

Table 6. Random-effects Probit Regressions of Firm Product Decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Period	0.003	0.005	0.006	-0.004	-0.003	-0.003
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Offered Fair Product$_{t-1,Firm}$	0.365***	0.479***	0.490***	0.310**	0.306***	0.409***
	(0.118)	(0.125)	(0.126)	(0.122)	(0.121)	(0.128)
Unsold Fair Product$_{t-1,Market}$		-0.377***	-0.250**			-0.313***
		(0.072)	(0.120)			(0.074)
Fair Product Price Premium$_{t-1,Market}$				0.062***	0.075***	0.058***
				(0.012)	(0.022)	(0.012)
High Firm Competition	0.361	0.385	0.581	0.283	0.133	0.309
	(0.358)	(0.354)	(0.365)	(0.358)	(0.394)	(0.355)
Limited Information (Free)	-0.294	-0.337	-0.275	-0.256	-0.053	-0.303
	(0.408)	(0.403)	(0.400)	(0.407)	(0.442)	(0.403)
Limited Information (Costly)	-0.080	-0.102	-0.062	0.006	0.258	-0.019
	(0.396)	(0.391)	(0.393)	(0.402)	(0.417)	(0.396)
Unsold Fair Product$_{t-1}$ X High Firm Competition			-0.394*			
			(0.210)			
Unsold Fair Product$_{t-1}$ X Limited Information (Free)			-0.149			
			(0.184)			
Unsold Fair Product$_{t-1}$ X Limited Information (Costly)			-0.086			
			(0.185)			
Fair Product Price Premium$_{t-1}$ X High Firm Competition					0.021	
					(0.029)	
Fair Product Price Premium$_{t-1}$ X Limited Information (Free)					-0.042	
					(0.034)	
Fair Product Price Premium$_{t-1}$ X Limited Information (Costly)					-0.080**	
					(0.032)	
Constant	-0.409	-0.323	-0.391	-0.590**	-0.672**	-0.504*
	(0.291)	(0.288)	(0.290)	(0.294)	(0.309)	(0.291)
Observations	3,726	3,726	3,726	3,530	3,530	3,530
Number of subjects	162	162	162	162	162	162

Robust standard errors (clustered by subject) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The coefficients for the variable Period shows that there is no significant general time trend in the kinds of products offered by firms, in any specification. The variable, *Offered Fair Product$_{t-1,Firm}$*, identifies whether the specific firm offered a fair product in the previous period. The positive and statistically significant coefficient suggests a tendency to repeat the product choice from the prior period. This is consistent with a firm-specific propensity to either offer fair or unfair products across periods; we document such firm-level heterogeneity more precisely in the next section.

In Model 1, we also see that the binary variables identifying each treatment condition, relative to the Market Baseline, are never statistically significant. This is also the case in all other models. Thus, there is no general tendency toward more or less frequent fair product offers across the market conditions.

Models 2 and 3 introduce a variable, *Unsold Fair Product*$_{t\text{-}1,Market}$, which identifies the proportion of unsold products in the market in the prior period that were fair products. For example, if only unfair products were unsold in the prior period this variable equaled 0, while if only fair products went unsold this variable equaled 1; the variable takes on intermediate values in all other cases.[27] The negative and significant coefficients for this variable indicate that firms responded to past market outcomes—they were significantly less likely to offer a fair product if the products that were unsold in the prior period contained a greater proportion of fair products. When Model 3 introduces interactions with the different market conditions, we see that this effect is strongest in the High Firm Competition condition. This is natural, given that the increased competition in that treatment likely led firms to be more concerned with whether their product offer would not be purchased.

Models 4 and 5 introduce another variable identifying lagged market outcomes. The variable, *Fair Product Price Premium*$_{t\text{-}1,Market}$, identifies the difference between the mean price for fair products and that for unfair products purchased in the prior period.[28] The positive and significant coefficients for this variable indicate that firms respond to the lagged price difference, becoming more likely to offer a fair product when these sold at a higher premium in the prior period. The treatment interactions reveal no significant difference for the Limited Information (Free) condition or for the High Firm Competition condition. However, the relationship between lagged price premium and product type decisions is significantly weaker when product information is costly for consumers.[29]

Finally, Model 6 incorporates both of the above lagged market variables simultaneously. Both the types of unsold products and the price premium in the previous period continue to have an effect when studied together.

Result 6: *Firm's product offer decisions are generally responsive to market conditions. Firms offer more fair products when such products previously sold at a higher price and were less likely to remain unsold.*

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[27] Recall that, in most conditions, there was at least one unsold product in every period, while in the High Firm Competition condition there were at least three. There were more in the few cases in which a consumer did not buy a product. We construct this variable so that it is always between 0 and 1, as it measures the proportion of unsold products that were fair.

[28] Specifically, we calculated the mean price for all fair products purchased by consumers in the prior period, and did the same for all purchased unfair products, and subtracted the latter from the former. We omit cases in which at least one type of each product was not purchased.

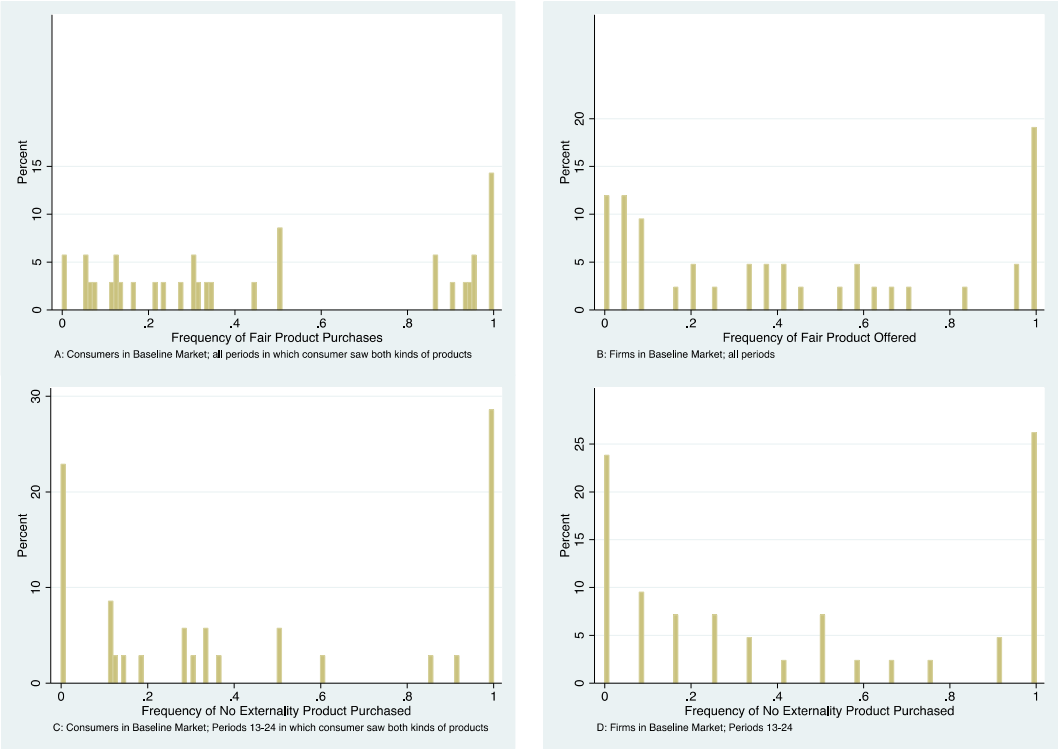
[29] We speculate that this might reflect a generally weaker relationship between prices and product types when consumers have limited information. To explore this possibility, we compute the correlations between the prices and product types separately for each treatment condition. We indeed find that the correlation is higher in the two experimental conditions without limited consumer information (Market Baseline: $r = 0.50$; High Firm Competition: $r = 0.52$) than in those with (Limited Info. Free: $r = 0.39$; Limited Info. Costly: $r = 0.38$).

5.3 Consumer and Firm Heterogeneity

The above results indicate a considerable influence of concerns for social responsibility in average individual market behavior by consumers and firms. Of course, these results hide potentially significant individual differences in concerns for social impact. Indeed, individual choice experiments—e.g., using dictator games—usually reveal heterogeneous concerns for fairness by individuals (Camerer, 2003; Engel, 2011).

Figure 6 presents histograms showing, separately, how often each consumer purchased or each firm offered a fair product, pooling the individual's decisions across periods. We present here only the data for the Market Baseline condition.[30] The top two panels, A and B, show the individual behavior of buyers and sellers, respectively, over the entire experiment; the bottom two panels, C and D, do so for only the second half of the experiment (periods 13-24). For consumers, we consider only those periods in which the consumer had a choice between at least one fair and one unfair product.

Figure 6. Distributions of Individual Behavior (Market Baseline)



Looking first at the entire experiment, in Panels A and B, we see considerable heterogeneity in the behavior of both consumers and firms. For example, while some consumers (6 percent) never purchase a fair product, a larger proportion (14 percent) does so in every period. A similar pattern obtains for firms: a smaller proportion (12 percent) never offers a fair product than those who always do so (19 percent). Moreover, while in both graphs there is mass at the extremes, the

[30] Comparable graphs for all other market conditions are provided in the Appendix, see Figures A2 – A4. The distributions are qualitatively similar across all conditions.

majority of subjects lie in between—purchasing or offering both kinds of products over the course of the experiment.

In the second half of the experiment, in Panels C and D, there is clearly greater differentiation in the behavior of both firms and consumers. Among consumers, the proportion that never purchase the fair product increases to 23 percent, while the proportion who always do so is even higher (29 percent). For firms, the proportions are similar: 24 percent never offer the fair product, while 26 percent always do so. Thus, for both consumers and firms, behavior in the second half of the experiment reflects both high degrees of heterogeneity and fairly strong invariance in individual behavior. Some firms and consumers, roughly half, either always offer or purchase the fair product or never do so. This finding is similar across all market conditions (see Appendix). This supports the idea that the socially responsible outcomes that we observe in aggregate market outcomes are the product of heterogeneous individual concerns for fairness and social impact held by market participants, comparable to the heterogeneity observed in individual choice experiments.

Result 7: *Individual consumer and firm behavior in the market reflect heterogeneous and somewhat stable concerns for the third party.*

6. Market Consumer Behavior versus Individual Non-Market Choices

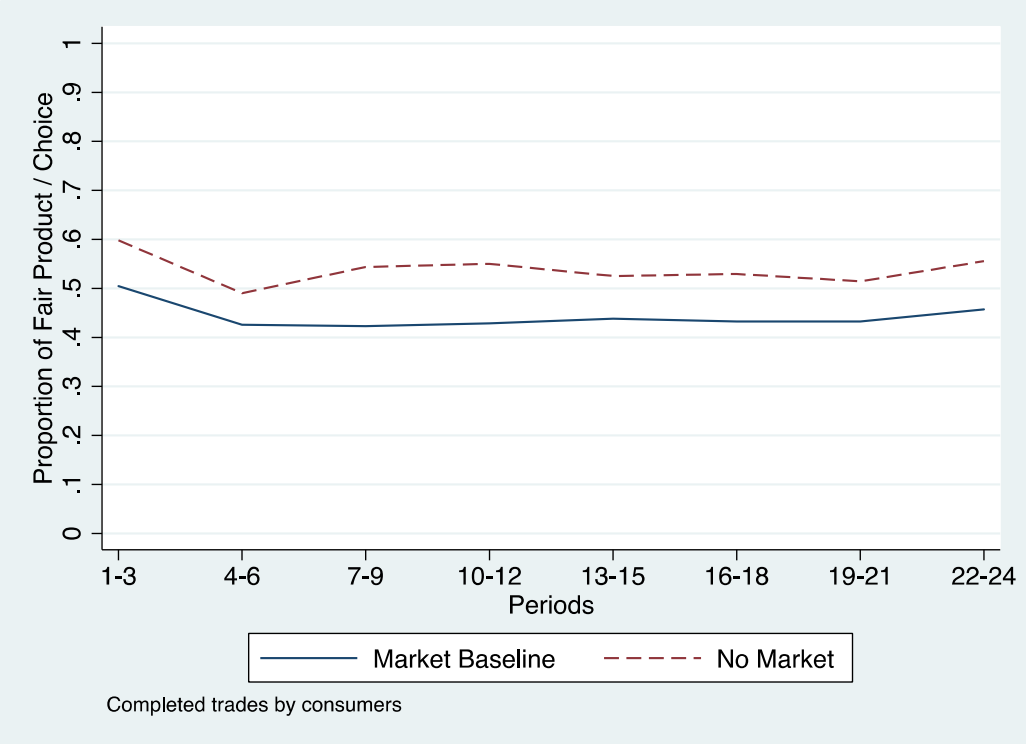
The analysis so far clearly shows that socially responsible behavior is not eliminated by repeated market interactions. Instead, we document a stable concern for social impact, represented in market shares, prices and individual consumer and firm behavior. To study whether the level of social concern exhibited in our markets is comparable to that in non-market individual choice contexts, we compare the choices of consumers in our Market Baseline condition with consequentially almost identical choices faced by individuals in our No Market condition. This latter condition mimics distributional decision tasks, such as the dictator game, typically used to measure fairness in individual choice experiments.

Our design allows a direct comparison between the choices made by consumers in the Market Baseline condition and by a comparable group of subjects in the No Market condition. Recall from the experimental design in Section 2 that we created the No Market condition by taking the 24 product choice sets facing each of the consumers in the Market Baseline condition, and presenting these exact 24 choices—with identical monetary consequences for a set of three subjects—to other subjects in the No Market condition. Thus, from a purely monetary point of view, the 24 choice sets faced by one subject in the No Market condition are identical to the 24 choices sets faced by a consumer in the Market Baseline.

The dashed line in Figure 7 shows the proportion of "fair" choices—i.e., choices that imposed no "externality" on the "third party"—made by consumers in the No Market condition. The solid line shows the comparable proportion in the

Market Baseline (as in Figure 1).[31] Consistent with the idea that markets diminish socially responsible or moral behavior (e.g., Falk and Szech, 2013), the proportion of fair choices is higher in the No Market condition relative to the Market Baseline. However, the difference is not very large: 44.3 percent vs. 53.8 percent. Moreover, as the random-effects probit regressions reported in Models 1 and 2 in Table 7 reveal, the differences in proportions do not differ significantly, neither in levels, as indicated by the coefficient for No Market, nor in trends across time.

Figure 7. Fair Product Purchases in Baseline Market and No Market Conditions

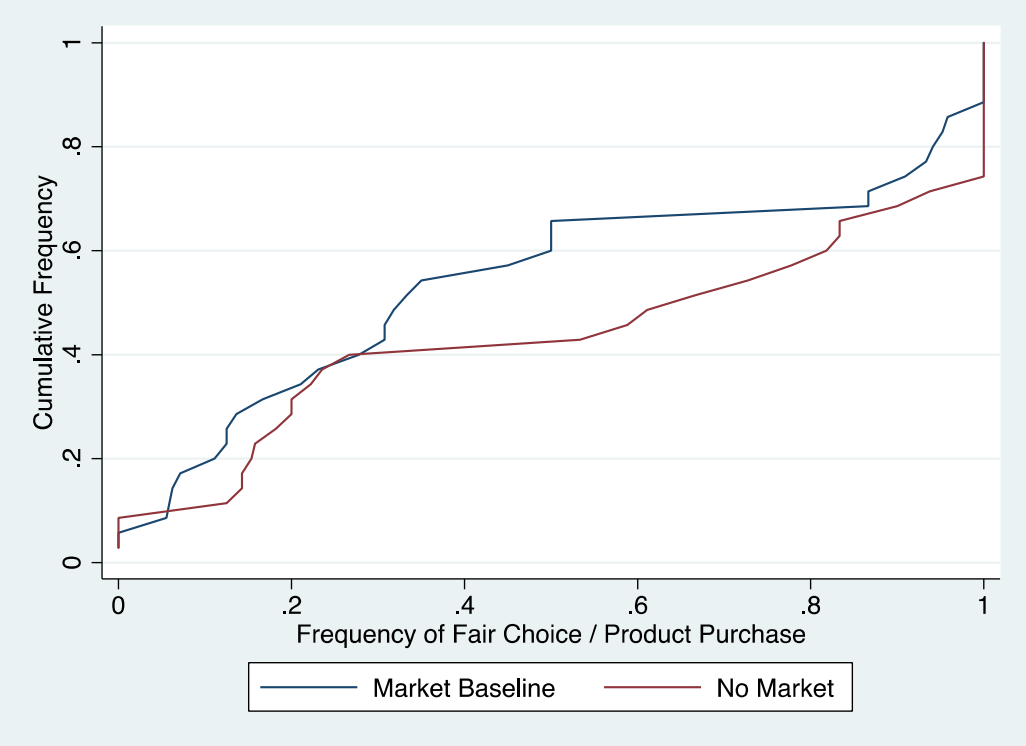


We can also compare the distributions of the individual behavior of subjects in the No Market condition and of consumers in the Market Baseline, across the experiment. For this purpose, we return to the individual-specific measures of frequency of fair choices, reported in Figure 6. Figure 8 shows the analogous cumulative frequencies of subject behavior for buyers in both the Market Baseline (the same data as in Figure 6, Panel A, transformed into a cumulative density) and for decision makers in the No Market condition. Comparing individual behavior leads to a similar conclusion as the one we draw above. The comparison suggests slightly less fair behavior in the Market Baseline than under No Market. For example, the cumulative frequency for the Market Baseline is almost always higher than for the No Market condition, reflecting a tendency toward less frequent fair

[31] For comparability with the Market Baseline condition, where we omitted cases in which a consumer did not purchase a product, we omit cases in the No Market condition in which a subject made the analogous choice. While such choices could be interpreted as exhibiting a high concern for equality (since they yield payoffs of 100 for all parties), they are inefficient and also infrequent in the No Market condition (3 percent of cases). Including such choices in both the Market Baseline and No Market condition has no substantive effect on the results.

behavior by market consumers. Moreover, there are roughly twice as many subjects in the No Market condition who always chose fairly than in the Market Baseline (14.3 vs. 28.5 percent). However, as with the analysis in Table 7, statistical comparisons of the distributions yield insignificant differences (Kolmogorov-Smirnov: $D_{35,35} = 0.26$, $p = 0.20$; Wilcoxon rank-sum: $z = 1.10$, $p = 0.27$).[32]

Figure 8. Cumulative Frequencies of Individual Socially Responsible Behavior



Returning to the utility specification in Section 4.1 and the respective conditional logit model, Models 8 and 9 in Table 5 allow comparisons of consumer and individual preferences, between the No Market and Market Baseline conditions, similar to those we made earlier for the different market conditions. Model 8 reveals that subjects in the No Market condition care both about their own monetary payoff ($\beta > 0$) and about the welfare of the third party ($\gamma > 0$), with both coefficients highly statistically significant. The ratio of the two coefficients, which can be interpreted as the relative concern that subjects place on their own payoff versus the payoff of the "third party" (Player C), is lower in the No Market condition (8.1) than in the Market Baseline (11.3). This difference is also reflected in the negative and statistically significant coefficient for the interaction term, Consumer X Treatment, in Model 9. Thus, the observation that market fairness is lower than the fairness

[32] These statistical comparisons treat the observations as independent between conditions. However, the nature of the data is such that the choices presented to subjects are paired—each subject in the No Market condition is presented with the same choices as a buyer in the Market Baseline. This allows us to conduct a paired comparison of how behavior changes between conditions, when holding constant the choice set. This analysis similarly finds no significant difference between conditions ($t_{34} = 1.12$, $p = 0.27$; sign test: $p = 0.38$).

observed in the No Market condition is significant when we analyze the behavior of individual consumers.

Table 7. Random-effects Probit Regressions of Fair Choices in the No Market Condition and Fair Product Purchases in the Market Baseline

	(1)	(2)
No Market	0.330	0.314
	(0.321)	(0.302)
Period		-0.007
		(0.008)
Period X No Market		0.001
		(0.012)
Constant	-0.091	-0.008
	(0.227)	(0.206)
Observations	1,643	1,643
Number of subjects	70	70

Omits cases in which consumer made no product purchase and the respective choices in No Market condition

Robust standard errors (clustered by subject) in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Result 8: *Socially responsible behavior is slightly—though not always statistically significantly—more prevalent in the No Market than in the Market Baseline condition.*

Thus, we find, in contrast to other recent work (e.g., Falk and Szech, 2013), that social responsibility in our market setting is only slightly lower than that in non-market contexts. A nice feature of our design is that we create almost identical paired choices—in terms of the procedures of making a choice and the monetary consequences—confronting market consumers and individual non-market decision makers. This procedure allows a direct comparison between market and non-market behavior, while holding many aspects of the choice constant.[33]

7. Conclusion

This paper provides experimental evidence addressing the question of whether concerns for social responsibility persist in repeated market interaction. To this end, we develop and experimentally study a laboratory product market, in which socially responsible behavior involves incurring additional production costs to mitigate a potential negative externality imposed on a non-market participant. We find strong

[33] Of course, there are nevertheless numerous differences between our market and non-market choice contexts, which may be responsible for the slight differences we observe. As with similar prior work, in this paper we do not attempt to study which of many possible varying factors might be responsible for differences between market and non-market pro-social behavior, though we discuss some of these factors in the next section.

evidence that socially responsible behavior is consistent with market exchange, and that repeated market experience does not erode such concerns.

Our data show, first, that there is a substantial and constant share of socially responsible products supplied and demanded in all our market conditions. Second, the socially responsible product, which avoids imposing a negative externality on a third party but costs more to produce, sells at a price premium that does not decrease with market experience. In some cases, this price premium even increases over time, suggesting that the consumers' willingness to pay in order to behave in a socially responsible way is not eliminated, but is rather heightened, over the course of the repeated market interaction. Third, we show that individual-level behavior is consistent with a preference for acting socially responsibly, though such concerns are heterogeneous. Finally, we show that a direct comparison between market and non-market behavior reveals the latter to be only slightly more concerned with social impact. Thus, to summarize, we find that social concerns are manifested in markets, that they are persistent and robust, and that they are comparable to the degree of social concern elicited through direct individual choice.

Aside from demonstrating the presence of social responsibility in markets, we also document its robustness to varying market conditions. We show that socially conscious behavior persists despite high levels of firm competition and limited consumer information. Of course, there are many possible alternative market characteristics that may impact the degree of socially responsible behavior, and our design easily lends itself to further study in this regard. In our case, we selected two features—increased competition and limited information —that have been shown to influence the manifestation of social concerns in prior work (Roth, et al., 1991; Dana, et al., 2007). Indeed, as in prior work, increased competition in our experiment decreases the equitable distribution of surplus between firms and consumers—that is, it pushes prices closer toward the competitive equilibrium outcome. However, the impacts on social concern toward the non-market third party are small and, if anything, the degree of concern revealed by market behavior increases with stronger competition.

Our results complement and counterbalance recent propositions and empirical findings that markets erode moral values. Our data do not reject the possibility that market interaction *may* reduce the prevalence of socially responsible behavior. Instead, we provide a clear example of where, in four different variants of a market, social concerns are prevalent and stable over time and only slightly lower than in comparable non-market decisions. Our results, therefore, draw attention to the important challenge of understanding better the conditions under which markets erode moral values—or even maybe the conditions under which they increase them—rather than making claims that they generally do or do not.

Where markets do exert influence on socially responsible behavior, it is also important to understand what factors are responsible. Many things differ between individual choices and market decisions. These include diffusion of responsibility between market participants, the use of contextually rich terms like "prices," "profit," and "selling" in market contexts, and strategic motives and opportunities for social learning that may be present in market interaction but absent in individual choice. Some of these features may be inherent to the distinction between market

behavior and individual choice. Hence, both our experiment and similar previous work that compares market and non-market behavior necessarily varies multiple characteristics at once. However, our design controls for other potential differences, such as the precise choice sets offered to decision makers, the degree of interaction between market participants and the duration of repetition, which are not accounted for in similar prior studies.[34]

Another critical difference between our market experiment and other prior work is that we allow the presence of a technology that can mitigate the externality, at a cost to market participants. The prevalence of such technologies is widespread in most existing markets. For example, "green," "fair trade," "ethical sourcing," and "cruelty-free" production are features of many products, which often involve higher costs that must be borne in some combination by firms and consumers. But, such products are nevertheless often visible in the market. It is natural, therefore, to study social responsibility in the presence of such technologies. In this sense, our design allows social responsibility to be consistent with market exchange, rather than entirely orthogonal, as in some prior work. Our design also lends itself to variations that study alternative technologies, to understand how these influence the prevalence of socially responsible market behavior.[35]

Much more work is required to understand better the conditions under which markets will reflect concerns for social responsibility, and "morality." To this end, one of our contributions is what we believe to be a valuable experimental paradigm. As we note earlier, our design is easily modified to incorporate varying and possibly heterogeneous production technologies or market characteristics. It is also straightforward to incorporate additional realistic features like firm reputation, products with greater heterogeneity in social impact, and market regulations, which we intentionally omit from our current experiment with the goal of simplicity. All of these possibilities raise interesting questions and topics for future research.

[34] For example, Falk and Szech's (2013) comparison between market and non-market choice contexts compares an interactive, repeated, double-auction, bargaining context with a one-shot individual choice setting involving different kinds of choices. In our comparison, consumers and decision makers are always presented with the same choice menus—in both market and non-market contexts—repeated the same number of times, and do not otherwise interact with sellers in the market case.

[35] Evidence that socially responsible market behavior is robust to alternative market characteristics and production technologies can be seen in a recent working paper by Danz, et al. (2012), which studies whether consumers with monopsony power in a duopoly market setting are willing to pay more for products produced by firms that pay higher wages to their workers. They find that a substantial proportion of consumers buy a higher-priced product if it also yields a higher wage for the worker. The specific focus of their paper is on how such concern by consumers is affected by variations in minimum wage policies.

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Appendix A: Social Responsibility Modeled as Inequity Aversion

In this appendix, we apply a widely used model of social preferences—the model of inequity aversion of Fehr and Schmidt (1999)—to our experimental setting and show conditions under which a single firm and a single consumer would prefer trading the fair product over trading the unfair product. Thus, we provide an illustrative example of how the model of inequity aversion can be used to account for socially responsible behavior in markets.

Suppose a consumer cares not only about her own monetary payoff but also about the payoff of the matched third party. More precisely, an inequity-averse consumer experiences disutility equal to $\beta < 1$ times the (positive) difference between her own payoff and that of the third party, in addition to the utility produced by her own payoff. (For simplicity we assume for the moment that the consumer does not care about the firm's payoff.) For given prices, $p^f \leq 50$ for the fair product and $p^u \leq 50$ for the unfair product, the consumer prefers buying the fair product over buying the unfair product if,

$$\begin{aligned} U(\text{fair}) = 150 - p^f - \beta\left(150 - p^f - 100\right) &\geq 150 - p^u - \beta(150 - p^u - 40) \\ &= U(\text{unfair}) \\ \Leftrightarrow \Delta p = p^f - p^u &\leq \frac{60\beta}{1-\beta} \end{aligned} \tag{1}$$

that is, if the price premium for the fair product does not exceed the r.h.s. of (1), which is increasing in the degree, $\beta < 1$, of aversion to favorable inequity.

Next, suppose a firm cares not only about its own monetary payoff but also about the payoff of the third party, again in proportion to some weight placed on advantageous inequity, $\beta < 1$. (For simplicity we also assume, for the moment, that the firm does not care about the consumer's payoff.) The firm prefers selling the fair product at a price $p^f \geq 10$ (ensuring that the firm is never worse off than the third party) over selling the unfair product if,

$$\begin{aligned} \Pi(\text{fair}) = 90 + p^f - \beta\left(90 + p^f - 100\right) &\geq 100 + p^u - \beta(100 + p^u - 40) \\ &= \Pi(\text{unfair}) \\ \Leftrightarrow \Delta p = p^f - p^u &\geq \frac{10 - 70\beta}{1-\beta} \end{aligned} \tag{2}$$

that is, if the price premium for the fair product is as least as high as the r.h.s. of (2), which is decreasing in the degree, $\beta < 1$, of favorable inequity aversion.

Assume further that both firm and consumer have the same degree, β, of inequity aversion. It then follows from (1) and (2) that if $\beta \geq 1/13$, the consumer's willingness to pay for the fair product is as least as high as the firm's required price premium. In such cases, there will always be a price premium such that both parties prefer, at least weakly, trading the fair product. If $\beta = 1/13$, the price premium will be exactly 5, and if $\beta > 1/13$, different price premiums are possible, where either firm or consumer bear a larger share of the additional cost of 10. If $\beta \geq 1/7$, it is

possible that either the firm or the consumer bears the entire additional production cost, i.e. all price premiums between 0 and 10 are possible. The left panel of Figure A1 provides an illustration.

If firms and consumers also care about each other's payoffs, conditions (1) and (2) become, respectively,

$$\Delta p = p^f - p^u \leq \frac{25\beta}{1 - \frac{3}{2}\beta} \tag{1'}$$

$$\Delta p = p^f - p^u \geq \frac{10 + 5\alpha - 35\beta}{1 + \alpha - \frac{1}{2}\beta} \tag{2'}$$

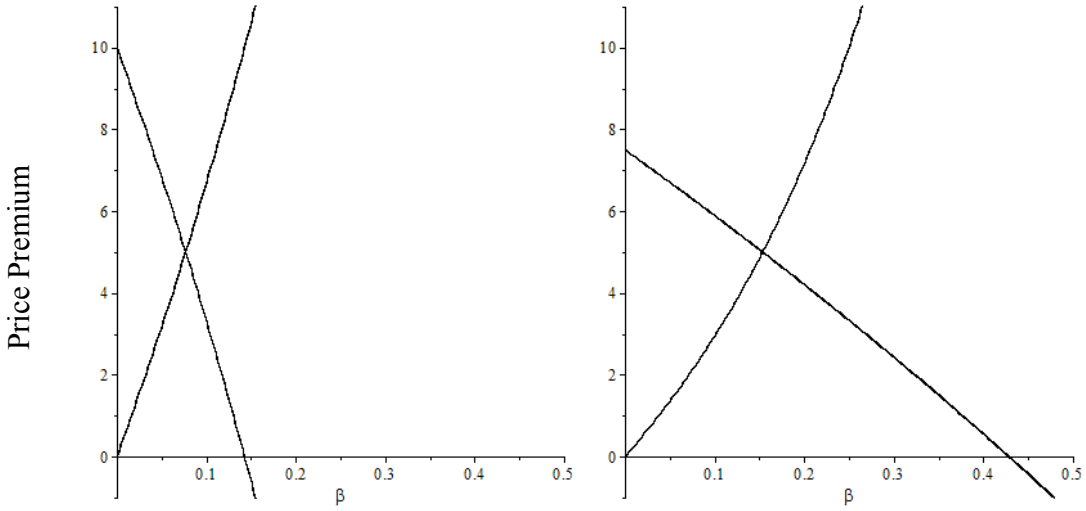
where, for simplicity, we impose the restriction (which is borne out in our data) that $10 \leq p^f \leq 30$ and $p^u \leq 25$, i.e., the firm is not better off than the consumer but also not worse off than the third party. The parameter, α, captures the degree of aversion to unfavorable inequity.

Condition (2') reveals that a firm with $\alpha > 0$, would now be willing to offer the fair product at a price premium of less than 10 (but always more than 5) even if $\beta = 0$. The reason is that the higher price of the fair product reduces the payoff of the consumer by more (by the price premium) than it reduces the payoff of the firm (by 10 minus the price premium). Recall that both types of the product are worth 50 to the consumer, and that the production cost of the fair product is 10 units higher than the production cost of the unfair product. Thus, a price premium larger than 5 decreases the unfavorable inequity of the firm towards the consumer. This is illustrated in the right panel of Figure A1.

Assume again that both firm and consumer have the same degree of inequity aversion, β. (Note that α is irrelevant for the consumer, who is better off than both firm and third party.) It then follows from (1') and (2') that if $\beta \geq 2/13$, the consumer's willingness to pay for the fair product is as least as high as the firm's required price premium. Hence, there will always be a price premium such that both parties prefer, at least weakly, trading the fair product. The price premium will be exactly 5 if $\beta = 2/13$. Note that at a price premium of exactly 5, the payoff difference between the firm and the consumer is independent of the type of the product that is traded. Note that the cutoff-value, $\beta = 2/13$, is exactly twice as large as the cutoff value in the case where social comparisons are made only towards the third party. The doubled threshold is due to the fact that the weight of the third party in the firm's and the consumer's social comparison term is reduced to $\beta/2$ in the Fehr-Schmidt model. Moreover, for a price premium of exactly 5, where firm and consumer share the additional production costs equally, the preference parameter α is irrelevant for the product type choice and thus does not affect the threshold value for β. If $\beta > 2/13$, different price premiums are possible, where either firm or consumer bear a larger share of the additional cost of 10. A consumer would now be willing to bear the entire extra cost of the fair product only if $\beta \geq 1/4$. Again, the

higher threshold is due to the reduced weight of the third party in the consumer's social comparison term. If $\beta \geq (10 + 5\alpha)/35$, the firm would be willing to bear the entire additional production cost, i.e. all price premiums between 0 and 10 are then possible. The right panel shows this situation for $\alpha = 1$, where the firm's cut-off value is given by $\beta = 3/7$.

Figure A1. Price Premiums as Functions of the Inequity Aversion Parameter β



Left panel:
Comparisons with third party only

Right panel:
Multilateral comparisons

Notes: The left panel considers the case where firms and consumers compare their payoffs only to the third party. It shows the minimal price premium that a firm demands in order to offer the fair product instead of the unfair product type (decreasing line) and the maximal price premium that a consumer is willing to pay for the fair product (increasing line), both as a function of the degree of favorable inequity aversion (β). The right panel considers the case where social comparisons also include the respective other trading party. The decreasing curve for the firm is drawn for $\alpha = 1$. Increasing (lowering) the values of α leads to a left (right) rotation of the curve around the intersection of the two curves.

Appendix B: Additional Figures

Figure A2: Prices by Product Type in the Limited Information Conditions

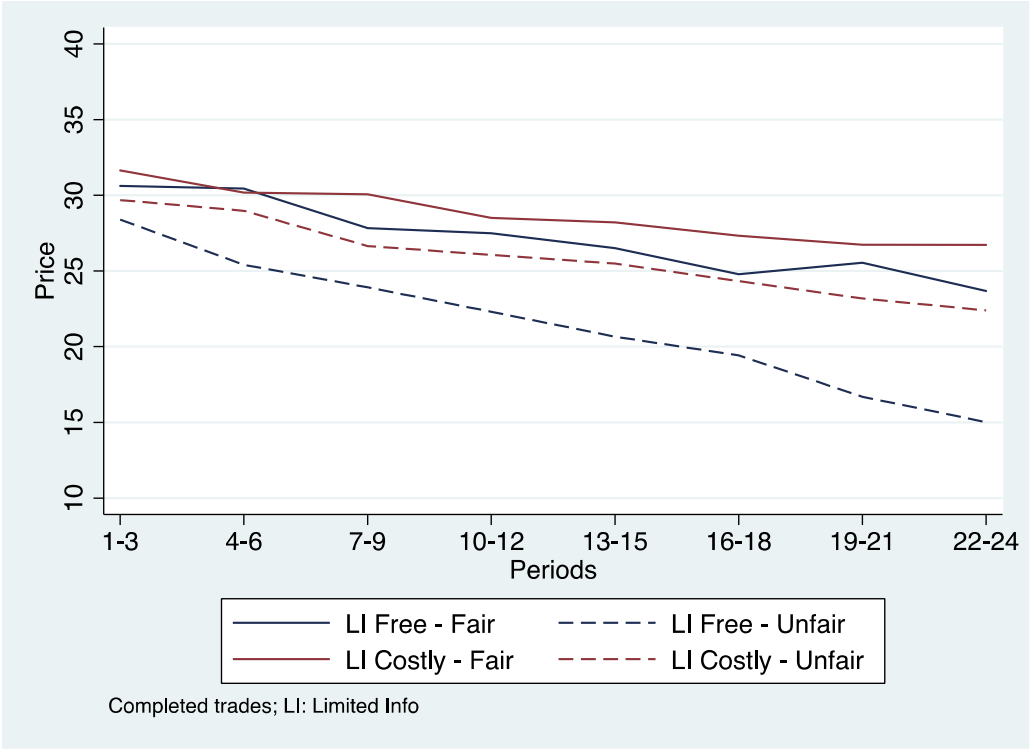


Figure A3: Distributions of Individual Behavior (High Firm Competition)

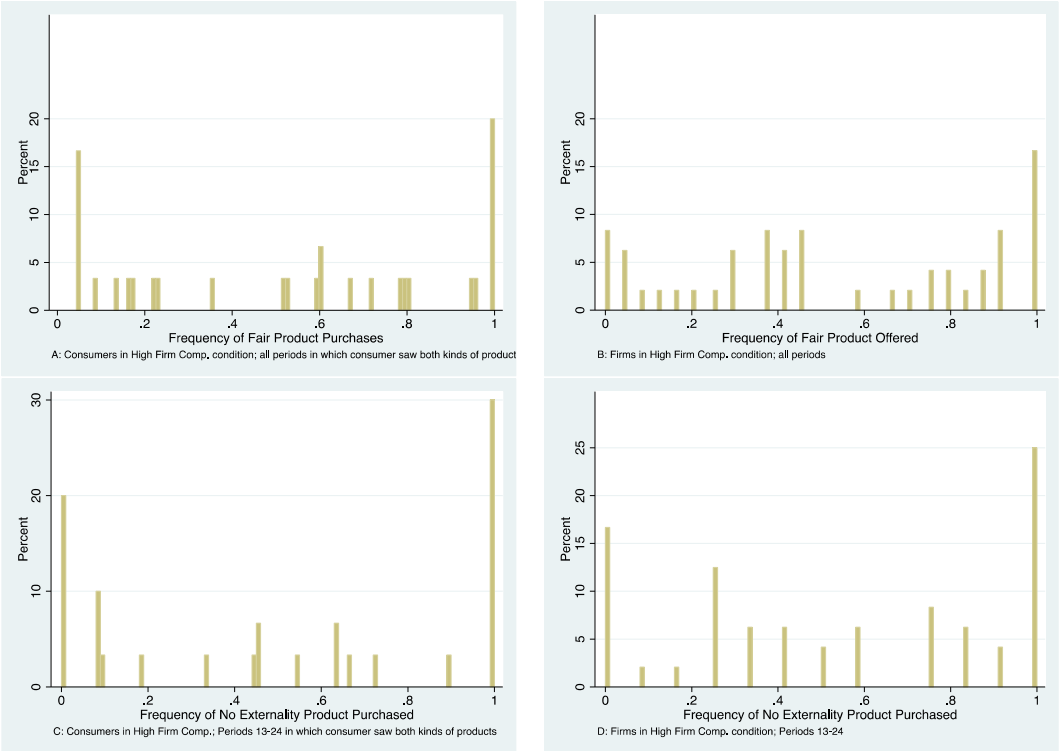


Figure A4: Distributions of Individual Behavior (Hidden Information Free)

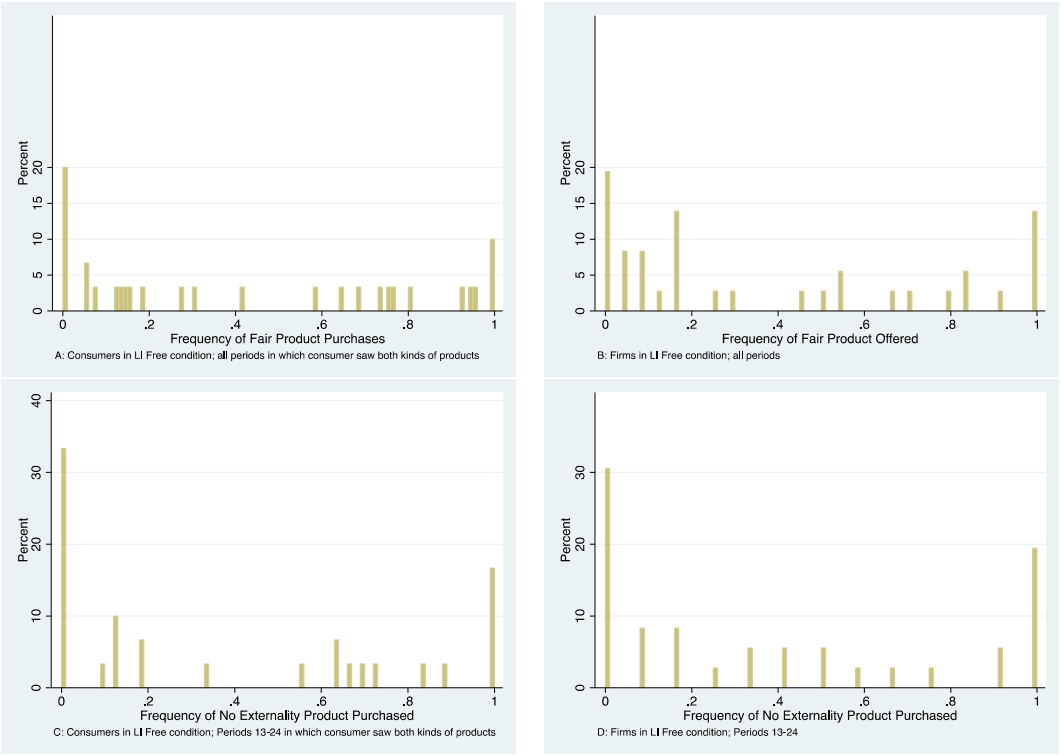
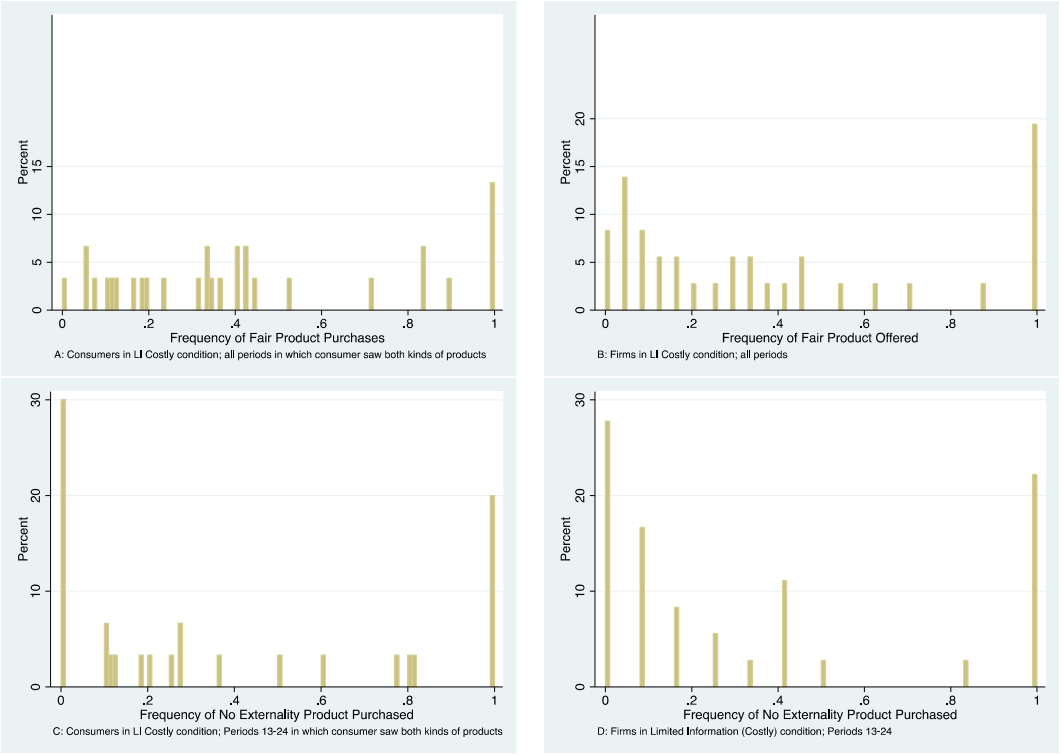


Figure A5: Distributions of Individual Behavior (Hidden Information Costly)



Appendix C: Experimental Instructions

A) Market Baseline

General instructions

We are pleased to welcome you to this economic study.

If you read the following instructions carefully, you can – depending on your decisions and/or those of the other participants – earn money in addition to the **15 Swiss francs** that you receive as an initial endowment for participating. It is thus very important that you read the instructions carefully. If you have any questions, please contact us.

Communication with the other participants is strictly forbidden during the study. Violation of this rule will lead to exclusion from the study and loss of all of the associated payments.

During the study, we will not speak of francs, but of points. Your entire income will thus first be calculated in points. The points you earn during the study will be converted to Swiss francs at the end of the study. The following conversion rate applies:

10 points = 2.50 Swiss francs.

At the end of today's study, you will receive the number of points earned during the study plus the initial endowment of 15 Swiss francs for appearing **in cash**.

We will explain the exact procedure of the study on the next pages. For the sake of simplicity, we will always use male forms for participants; the instructions also obviously refer to female participants.

The study

There are three types of participants in this study: participants A, B, and C. The participants in this study are divided into groups of 16 people. There are **6** participants A, **5** participants B, and **5** participants C in each group.

Participants A are sellers, participants B are buyers. Participants C can neither sell nor buy, but they can incur losses due to the transactions between the participants A and B.

The study last for 24 periods. In each period, each participant A makes exactly one sales offer for a product. Participant A thus determines the **type of product** and the **price** for the product.

- There are two types of products:
    1. **"Products with no effect on participant C"** and
    2. **"Products with a loss for participant C".**
- Every value from 0 up to and including 50 can be selected as a price.

The production costs for participants A for a "product with no effect on participant C" amount to **10 points**. Participant A bears no costs (**0 points**) for the production of a "product with a loss for participant C".

The value of a product for a participant B is always **50 points**, regardless of what type of product it is.

The five participants B see the sales offers made by the six participants A (the price and the type of product) and can accept one offer each. The participants B can decide one after the other in a random order. Each participant B can only accept one offer. This means that a maximum of five of the six participants A can sell a product.

In each period, each of the five participants B will be randomly assigned to one of the five participants C. If a participant B purchases a "product with a loss for participant C", the assigned participant C incurs a loss of **60 points**. If a participant B purchases a "product with no effect on participant C" or no product at all, the assigned participant C incurs no loss.

You will see whether you are participant A, B, or C on your screen at the beginning of the study. Your role as participant A, B, or C remains the same during the entire study.

In each period, each participant A, B, and C first receives an endowment of 100 points. The payment in points of participant A (seller), participant B (buyer), and participant C in a period are thus determined as follows:

Participant A's payment

- If a participant B accepts his sales offer

  100 – costs of production + price of the product

  where the production cost amounting to 10 points are incurred only with a "product without effect on participant C". The production costs for a "product with a loss for participant C amount to 0.
- If no participant B accepts his sales offer: ***100***

Participant B's payment:

- If participant B accepts a sales offer

  100 + 50 – price of the product
- If participant B does not accept a sales offer: ***100***

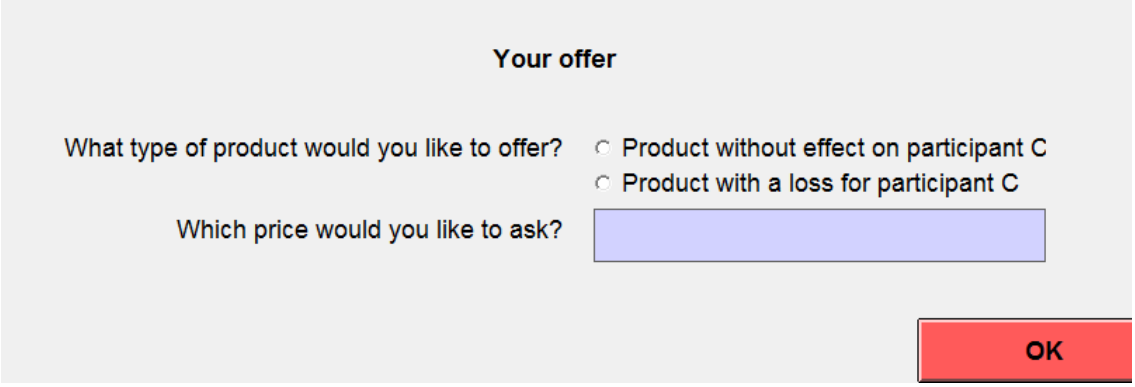
Participant C's payment:

- If the randomly assigned participant B chooses a "Product with loss for participant C"

  100 - 60
- If the randomly assigned participant B chooses a "Product without effect on participant C" or does not purchase a product: ***100***

Procedures on the computer:

In each period, participants A enter their sales offers on the following screen:

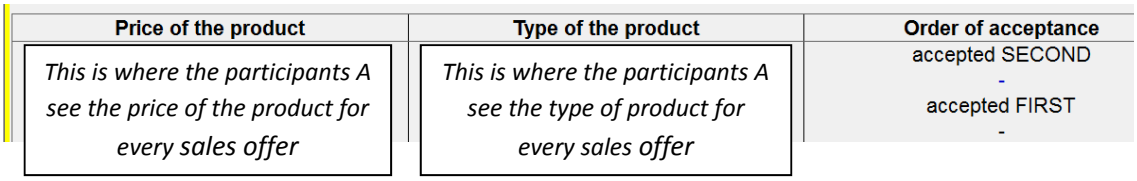


Participant A must indicate whether he wants to offer a "product without effect on participant C" or a "product with a loss for participant C." to do this, the corresponding type of product must be clicked on.

Furthermore, participant A must indicate the price he wants to request for the product. The corresponding number must be entered in the box. All integers from 0 up to and including 50 are possible.

Once a participant A has made his decisions, he must click on the OK button at the lower right-hand side. The type of product and the price can be changed until the OK button is clicked.

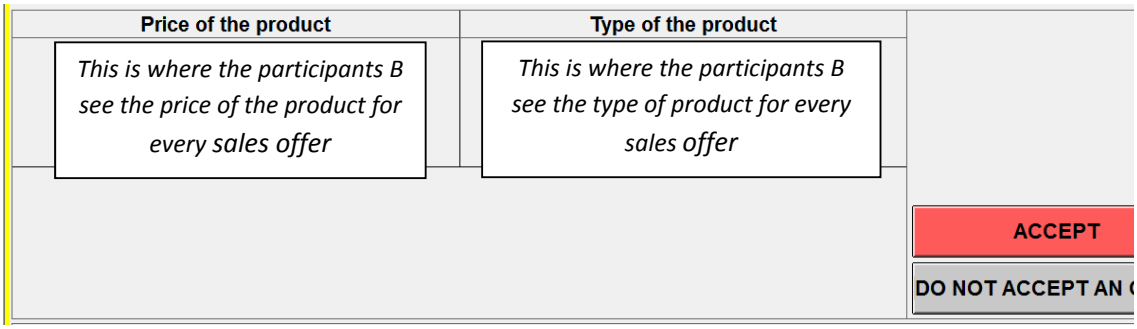
Once all six participants A have made their sales offers, the participants A will see the sales offers (the price and the type of product) of all of the other participants A in a table. Here is an example:



The participant's own sales offer is always marked in blue. Participants A can always see in the column on the right whether and in which order the participants B accept the offers.

Once all participants B have made their decisions, each participant A will learn of his own payment and – if his offer is accepted – participant B's payment and the payment of the corresponding participant C.

The **participants B** can see the sales offers on the screen below in each period:



Participants B see the screen above in a random order and can accept an offer one after the other. Thus only one participant B sees the screen above at any one point in time. Only when the current participant B has made his decisions will the next participant B see the screen above, where he can then accept an offer.

The participant B who is first shown the screen can select from all offers. The participant B who is shown the screen second can only choose from the remaining offers, as each offer can only be accepted by one participant B.

If the five participants B have each accepted an offer, one offer will always remain that can no longer be accepted. The participant A who made this offer cannot conclude a sale in this period.

The order in which the five participants B decide on accepting the six offers will be randomly determined anew in each period.

The prices appear in the left column of the table, and the type of product appears in the right column. Each offer is always in a separate row. In order to accept an offer, the corresponding row must be clicked on with the mouse. The marked row will then appear with a blue background.

- In order to accept the offer marked in blue, you must click on the ACCEPT button.

The choice of offer can be changed until the ACCEPT button is clicked on.

If a participant B does not want to accept an offer, he must click on the DO NOT ACCEPT AN OFFER button. Even if a row had already been marked, all offers will be declined if the DO NOT ACCEPT AN OFFER is clicked on.

When all participants B have made their decisions, each participant B will learn of his own payment and that of his assigned participant C.

Participants C cannot make any decisions during this study. We ask the participants C, however, to indicate in each period their expectations about the behaviors of participants A and B.

When all participants A and B have made their decisions, the participants C will learn of their own earnings, which are entirely dependent on the decisions of participants A and B.

After all participants have been informed about their payments in a period, the next period will begin.

Your earnings in this study are the payment out of <u>one</u> randomly selected period.

Because you do not know which period the computer will randomly select, you must consider your decisions in each of the 24 periods very carefully.

At the end of the study, the corresponding point amount will be converted to Swiss francs and paid in cash to you together with the initial endowment.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to answer the control questions on the next pages.

Control questions

1. Assume that participant A offers a "product without effect on participant C" at the price of 40 and participant B accepts the offer.
   How high are the payments to participants A and B and the corresponding participant C?

2. Assume that participant A offers a "product with a loss for participant C" at the price of 40 and participant B accepts the offer.
   How high are the payments to participants A and B and the corresponding participant C?

3. Assume that participant A offers a "product without effect on participant C" at the price of 15 and participant B accepts the offer.
   How high are the payments to participants A and B and the corresponding participant C?

4. Assume that participant A offers a "product with a loss for participant C" at the price of 15 and **no** participant B accepts the offer.
   How high is the payment for participant A? How high is the payment for a participant B who does not accept an offer? How high is the payment for the corresponding participant C?

Please raise your hand when you have completed the control questions. We will then come to you at your workplace.

B) No Market Condition

[General instructions as in Market Baseline]

The study

There are three types of participants in this study: participants A, B, and C. The participants in this study are divided into groups of 3 people. There is one participant A, one participant B, and one participant C in each group.

The study last for 24 periods. In each period, one participant A, one participant B, and one participant C are randomly assigned to one another.

In each period, the participants A, B, and C first receive an endowment of 100 points.

The Participant B in a group can select a different distribution of points. In case of a new distribution, the sum of the payments that participants A and B receive is 40 or 50 points greater than the initial endowment of 100 points each.

There are two types of distributions:

3. **"Distribution with no effect on participant C"** and
4. **"Distribution with a loss for participant C".**

If a participant B selects a "distribution with no effect on participant C," the assigned participant C incurs a **loss of 60 points**. If a participant B selects a "distribution with no effect on participant C" or does not opt for a new distribution, the assigned participant C will not incur any loss.

You will see whether you are participant A, B, or C on your screen at the beginning of the study. Your role as participant A, B, or C remains the same during the entire study.

In each period, each participant A, B, and C first receives an endowment of 100 points. The payment in points of participant A, B, and C in a period depend on the participant B's decisions and are determined as follows:

Participant A's payment

- If the randomly assigned participant B selects a new distribution

  Payment in the new distribution

- If the participant B does not select a new distribution: ***100***

Participant B's payment:

- If he selects a new distribution

  Payment in the new distribution

- If he does not select a new distribution: ***100***

Participant C's payment:

- If the randomly assigned participant B chooses a "Distribution with loss for participant C"

  100 - 60 = 40

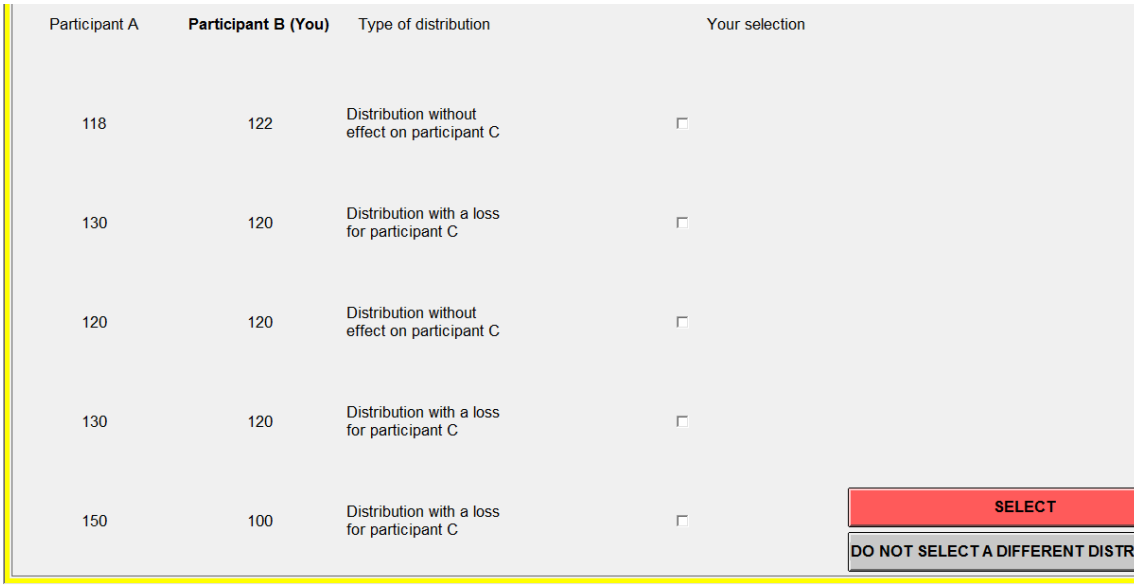
- If the randomly assigned participant B chooses a "Distribution without effect on participant C" or does not select a new distribution: ***100***

In case of a "distribution without effect on Participant C," the sum of the payments for participant A and participant B is 40 points higher than if no new distribution is chosen, for example 125 points for participant A and 115 points for participant B (and 100 points for participant C).

In case of a "distribution with a loss for Participant C," the sum of the payments for participant A and participant B is 50 points higher than if no new distribution is chosen, for example 120 points for participant A and 130 points for participant B (and 100 – 60 = 40 points for participant C).

Procedures on the computer:

In each period, **participants B** can select from possible new distributions on the following screen:



Participants B can choose from two to six different distributions in each period. In this case, for example, participant B can choose between five new, different distributions.

The left column of the table shows the possible payments for participant A, the middle column shows the possible payments for participant B, and the type of distribution is shown in the right column. Each new distribution always appears in a separate row. In order to select a new distribution, the box at the far right must be clicked on with the mouse.

- The SELECT button must be clicked on in order to select the chosen distribution.

The type of distribution can be changed until the SELECT button is clicked.

If a participant B does not want to select a new distribution, he must press the DO NOT SELECT A DIFFERENT DISTRIBUTION button. Even if new distribution had already been marked, no new distribution will be selected if the DO NOT SELECT A DIFFERENT DISTRIBUTION button is chosen.

When all participants B have made their decisions, the assigned participants A and C will be informed of the decision.

Participants A and C cannot make any decisions during this study. We ask the participants A and C, however, to indicate their expectations about the participant B's behavior in each period.

After all participants have been informed about their payments in a period, the next period will begin.

Your earnings in this study are the payment out of <u>one</u> randomly selected period.

Because you do not know which period the computer will randomly select, you must consider your decisions – if you are a participant B – in each of the 24 periods very carefully.

At the end of the study, the corresponding point amount will be converted to Swiss francs and paid in cash to you together with the initial endowment.

Do you have any further questions? If yes, please raise your hand. We will come to you at your workplace. Otherwise, we ask you to answer the control questions on the next pages.

Control questions

1. Assume that participant B chooses a new distribution and this is a "distribution without effect on participant C."
   How high are the payments to the participants A, B, and C randomly assigned to each other in this period?

2. Assume that participant B chooses a new distribution and this is a "distribution with a loss for participant C."
   How high are the payments to the participants A, B, and C randomly assigned to each other in this period?

3. Assume that participant B chooses no new distribution.
   How high are the payments to the participants A, B, and C randomly assigned to each other in this period?

Please raise your hand when you have completed the control questions. We will then come to you at your workplace.

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